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ABSTRACT

Second in a resource series (see note), this annotated bibliography provides detailed information on training curriculum and instructional materials for welding, brazing, and flame-cutting. The materials are divided into thirty-fie sections by topic and type. Specific topic areas include gas and arc welding; arc welding: oxyacetylene welding and cutting: specialized welding: advanced welding: pipe welding: tools and equipment; soldering: safety: metallurgy: mathematics, blueprint reading, and design; miscellaneous: careers; and publishers' addresses. Topical materials may be further categorized into one or all of the following: print materials, which include general textbooks, instructors' manuals, and student workbooks: non-print materials, which include films, records, slide sets, and transparencies: and packaged courses with materials for a complete course. The careers sections list materials and provide information on welding, brazing, and flame-cutting occupations. Each entry includes some or all of the following: title, source/publisher, number of pages, author(s), date, material(s) included, price, and annotations. A back page includes a list of publications available or being printed. (YLB)

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INTRODUCTION

Training Materials Sourcebook: Welding, Brazing and Flame-Cutting is the second publication in the Technical-Vocational Resources Series. The objective is to provide detailed information on training curriculum and instructional materials, especially in the vocational-occupational areas. These publications have been designed to assist instructors and administrators to select and obtain relevant training materials in their specialty area. The materials were selected from the publications of more than 450 publishers, and although the bibliography is not exhaustive, it is selective and comprehensive.

In addition to an annotation, each item includes the title of the material, its producer, its format, and acquisition information.

The material is divided into 35 sections. Many of the topics dealt with have sections divided into print materials, non-print materials and packaged courses. The print section includes such documents as general textbooks, instructors' manuals, and student workbooks. The non-print section includes films, records, slide sets, and transparencies. The packaged courses sections list materials for a complete course.

The careers sections list materials and provide information on welding, brazing and flame-cutting occupations.

The final section provides publishers' names and addresses.

The back page includes a list of publications available or being printed.

We hope you will find this publication useful and would appreciate any suggestions, comments or queries that you may have. They should be addressed to the undersigned.

V.R. Blake,
Course Assessment & Improvement,
Training Branch,
Canada Employment & Immigration
  Commission,
OTTAWA, Ontario.
K1A 0J9

MAR 1 4 1980

INTRODUCTION

Le Répertoire des matériaux didactiques: Soudage, brasage, et coupage oxyacétyléniques est le deuxième ouvrage de la série Ressources en formation professionnelle qui vise à fournir des informations détaillées sur les programmes et le matériel de formation, notamment à l'égard des métiers. La série aidera les moniteurs et les administrateurs à choisir et à se procurer le matériel de formation qui convient à leur domaine de spécialisation. Ce matériel a été choisi parmi les publications de plus de 400 éditeurs et même si notre liste n'est pas exhaustive, elle est sélective et très vaste.

Il s'agit d'une bibliographie annotée qui donne le titre de chaque ouvrage retenu, son format, la maison d'édition ainsi que la façon de se le procurer.

Les documents sont répartis en 35 sections. Pour nombre des sujets traités, ils sont divisés en documents imprimés, documents audio-visuels, ou selon des groupes de cours. Dans le premier cas, on retrouve des manuels généraux, des guides du moniteur et des cahiers de travaux pratiques. La deuxième section indique les films, les disques, les diaporamas et les diapositives disponibles. La troisième donne une liste des matériaux nécessaires pour un cours complet.

Les sections ayant trait aux carrières énumèrent le matériel disponible et donnent les renseignements sur les métiers de soudeur, de braseur et d'oxycoupeur.

Le dernier chapitre donne le nom et l'adresse des éditeurs.

La dernière page énumère certaines publications offertes sur le marché ou en cours d'impression.

Nous espérons que ce document vous sera utile et nous vous demandons de bien vouloir nous communiquer vos suggestions et vos observations; n'hésitez pas à vous adresser à nous si vous avez des questions. Veuillez écrire à ce sujet à l'adresse suivante:

V.R. Blake
Amélioration et évaluation des cours
Direction générale de la formation
Commission de l'emploi et de
  l'immigration du Canada
OTTAWA (Ontario)
K1A 0J9

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I

GAS AND ARC WELDING
PRINT MATERIALS

SOUDAGE À L'ARC ET AU GAZ
MATÉRIEL IMPRIMÉ

Basic Welding: A Course of Study

Curriculum and Instructional Materials Center, Oklahoma State Department of Vocational and Technical Education. Stillwater, Okla.: Author, 1974.
Instructor's Guide..$15.00
Student's Guide..$5.00

Behavioral objectives, suggested activities for instructors and students, information sheets, assignment sheets, job sheets, tests, answers to tests, and transparency masters are included.

Contents:

Shop orientation; Gas welding; Metals; Arc welding; Blueprint reading; and M.I.G. and T.I.G. welding.

* * * *

Forging and Welding

Smith, R.E. Bloomington, Ill.: McKnight Publishing Co., 1967, 160 pp. 2nd Edition. Hardcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$11.95

Safety, understanding, and step-by-step procedures are the keynotes of this text which covers forging, oxy-acetylene, gas arc and electric arc welding. Suggested projects, safety measures, reference lists, and necessary tables are included.

* * * *

Fundamentals of Oxy-acetylene and Arc Welding

Tuttle, C.A., & Sear, G.F. Toronto, Ont.: Copp Clark/Pitman Publishing, 1968, 213 pp.
....$6.95

This text prepares students for oxy-acetylene and arc welding at the vocational and trade school levels. It offers practical information about the fundamental principles and current techniques. A revised pamphlet on new metric information and changes has been inserted into the text until it is revised in full.

* * * *

Fusion Welding and Brazing of Copper and Copper Alloys

Dawson, R.J.C. New York, N.Y.: John Wiley & Sons, Inc., 1973, 139 pp. (John Wiley & Sons Canada Ltd., Rexdale, Ont.)
(V-0-470-19981-4)...$11.95

Contents:

Gas shielded arc welding processes; Gas shielded arc welding process applications: copper; Gas shielded arc welding applications: copper alloys; Welding copper--alloy castings; The dissimilar metal joint; The oxy-acetylene welding process and its applications; The bronze welding process; The brazing process; and Brazing with copper filler metals.

* * * *

Practical Welding

Scheck, L.A., & Edmondson, G.C. Beverly Hills, Calif.: BRUCE, A Division of Benziger Bruce & Glencoe, Inc., 1976, 160 pp.
(Collier Macmillan Canada, Ltd., Cambridge, Ont.)
(02.827530.6)..$9.20

This easy-to-read book with more than 300 photographs and line drawings makes for the complete comprehension of equipment, the welding position, joint design, and the actual welding to be done in the exercises. Safety is stressed. The book is teachable in any sequence.

Contents:

Introduction to oxy-acetylene welding; Basic principles of oxy-acetylene welding; Oxy-acetylene cutting; Miscellaneous processes; An introduction to arc welding; Basic principles of electric arc welding, AC and DC; Metal inert gas (M.I.G.) welding; and Tungsten Inert Gas (T.I.G.) welding.

* * * *

The Welder

Snotgrass, T. Austin, Tex.: Instructional Materials Center, University of Texas at Austin, 1976.

Coordinator's Guide	$14.95
Student's Guide	$14.95
Additional Tests and Work Sheets	$3.00

Developed for a two-year study, this book covers all the important aspects of the welding trade and explores the science of welding. Oxy-acetylene, arc, tungsten, inert gas, and other welding processes and techniques are covered. 99 assignments are included.

* * * *

Welder's Guide

Brumbaugh, J.E. Indianapolis, Ind.: Howard W. Sams & Co., Inc., 1973, 928 pp. 2nd Edition. Hardbound. (Lenbrook Industries Ltd., Scarborough, Ont.)
(23202)..$16.00

This is a manual on the theory, practical operation, and maintenance of all welding machines. Electric and oxy-gas welding are fully covered.

Contents:

Introduction to welding; Fundamentals of welding; Gas welding process; Arc welding equipment and supplies; Arc welding process; T.I.G. and M.I.G. welding; Submerged arc and other shielded arc welding processes; Stud welding; Metal cutting and flame hardening; Solders and soldering; Brazing and braze welding; Surfacing and metallizing processes; and Welding pipes, tubes, and pressure vessels.

* * * *

Welding

John Deere Service Publications. Moline, Ill.: Author, 1974, 124 pp. Softcover.
....$5.50

Contents:

The basics of gas and arc welding and cutting; Setting up the equipment; Preparing joints; Adjusting flame or arc; Brazing; Soldering; Metal surfacing; Designing welds for best strength and economy; Properties of metals, how to identify; Heat treating; Safety precautions--protective equipment, ventilation, and fire prevention; and a Glossary of terms and welding symbols.

* * * *

Welding

Vocational Education, California State Department of Education. Sacramento, Calif.: Author, 1976.
....$2.50

This workbook on welding also includes tests.

Contents:

General information on construction welding; Arc welding; Oxy-acetylene welding; and Welding of thermoplastics.

* * * *

Welding: Principles and Practices

Sacks, R.J. Peoria, Ill.: Chas. A. Bennett Co., Inc., 1976, 992 pp. (Copp Clark Publishing, Toronto, Ont.)
(207371)...$30.00
Instructor's Guide...$4.00
Student's Guide, 125 pp......................................$4.50

This book provides total instruction in welding, other joining processes, and cutting that takes the student from elementary procedures to technician skills. One thousand five hundred illustrations include "how-to" diagrams, charts, and metric tables. All standard welds are identified by blueprints and photographs. Both the principle principles (why) and practice ("how-to") are presented in gas, arc and semi-automatic welding, brazing, soldering, and plastic welding processes. The book also explains the treatment of equipment, electrodes, types of joints and welds, testing and inspection, metals and their welding characteristics, safety, and print reading. There are discussion questions at the end of each chapter. Photographs and drawings show the latest techniques and equipment. Course outlines are provided for each major process with emphasis on learning by doing. The book is suitable for on-the-job training and apprenticeship training programs. The Instructor's Guide has the answers to the review questions in the text, information for planning classroom and shop facilities; and techniques and procedures for teaching welding. There are also sections on ship equipment, supplies, safety, etc. The objective questions in the Student's Guide correlate with the chapters in the text.

Contents:

Introduction to welding; Industrial welding; Steel and other metals; Basic joints and welds; Gas welding; Shielded metal-arc welding principles; Electrodes; Flame and arc cutting principles; Gas tungsten arc welding principles; Gas metal-arc welding principles; General equipment for welding shops; Testing and inspection; Reading shop drawings; Welding symbols; Safety; Flame and arc cutting practice; Gas welding practice: jobs; Soldering and brazing; Braze welding and advanced gas welding practice: jobs; Shielded metal-arc welding practice: jobs; Gas tungsten-arc welding practice; Gas metal-arc welding practice with solid core wire and flux-cored wire; Submerged-arc welding and related processes; and Welding and bonding of plastics.

Recommended Levels: Secondary, Vocational and Trade Schools, Junior Colleges, and Engineering Schools.

* * * *

Welding: Procedures and Practices

Love, L.C. Englewood Cliffs, N.J.: Prentice-Hall International, 1975, 178 pp. (Prentice-Hall of Canada Ltd., Scarborough, Ont.)

(013-948034-X)..	$10.80
Instructor's Guide..	$5.00

This text develops three important and distinct areas--mechanical set-up, the manipulative factors that help produce desirable industrial-type welds, and metallurgical relationships. Safety guidelines and procedures are incorporated into each of these areas. The speed, the angles of the torch and filler metal, the spacing between the torch tip and the weld crater as well as a good coverage on distance relationships and oscillation of equipment are included. The control of impurities and utilization of fluxes, slags, and gases are discussed. The effects of alloying and the changes established as metals are exposed to welding fabrication are explored.

Contents:

Introduction to welding; Safety and accident prevention; Gas welding equipment; Gas welding and cutting techniques; Metal-arc welding equipment; Arc welding and cutting techniques; Gas shielded welding; Filler materials for welding selection and preparation of weld joints; Standard welding symbols; Testing and inspection of welds; and Welding metallurgy.

* * * *

Welding: Theory and Practice

Masson, F.N. Toronto, Ont.: Macmillan Co. of Canada, 1967.
....$3.95

This is an introductory text in welding. The importance of safety is stressed throughout the book and students are frequently reminded at chapter endings to check their work habits and safety practices.

Contents:

Chapters 2, 3, 4, 6, and 7 deal with oxy-acetylene welding only, while electric arc welding is covered in chapters 8, 9, 10, and 11. The remaining chapters deal with information related to both types of welding.

* * * *

Welding and Brazing - Metals Handbook Volume 6

American Society for Metals. Metals Park, Ohio: Author, 734 pp.
8th Edition.
(19-B)..$52.00

All major welding and brazing processes and their applications to ferrous and nonferrous metals are covered in the 44 articles. Six hundred and sixty-one examples of shop practice are included.

Contents:

Arc welding processes and their application to low-carbon steel: shielded metal-arc welding; flux-cored arc welding; submerged-arc welding; gas metal-arc welding (M.I.G.); gas tungsten-arc welding (T.I.G.); plasma-arc welding; proportions of grooves for arc welding; hardfacing by arc welding; stud welding; and percussion welding. Arc welding of: hardenable carbon steels; alloy steels; cast irons; stainless steel; heat-resisting alloys; aluminum alloys; copper and copper alloys; magnesium alloys; nickel alloys; and titanium alloys. Electroslag and electrogas welding. Resistance welding: resistance spot welding; resistance seam welding; projection welding; resistance welding of: stainless steel, aluminum alloys, and copper and copper alloys. Flash and friction welding. Electron beam welding. Gas welding: gas welding processes and their application to steel; oxy-acetylene braze welding; oxy-acetylene welding of cast irons; and hardfacing by oxy-acetylene welding. Brazing: furnace brazing of steel; torch brazing of steel; induction brazing of steel; resistance brazing; dip brazing of steel; brazing of: cast irons, stainless steel, aluminum alloys, and copper and copper alloys.

* * * *

Welding and Welding Technology

Little, R. New York, N.Y.: McGraw-Hill International Book Co., 1973, 448 pp. (McGraw-Hill Ryerson Ltd., Scarborough, Ont.)
(38095-3)...$13.22
(38096-1) Instructor's Guide............................$1.53

This introductory text was designed to teach students the "how" and "why" of welding. There are five major sections, each divided into short work units. The first unit in each section provides the scientific and technical justification for the welding techniques. The remaining units teach those techniques and show the students how to apply them in the fabrication of goods. Each unit has a set of questions as well as a sample project to give the students practical experience. There are numerous photographs of equipment, and line drawings and charts to clarify complex procedures.

Contents:

Gas welding: introduction; equipment; operation; joint preparation; ferrous; nonferrous; and cutting. Shielded arc welding: introduction; electrodes; equipment; operation; application; submerged arc; and carbon arc. Gas shielded arc welding: introduction; equipment T.I.G. operation; and M.I.G. operation. Welding processes: plasma arc; resistance; electroslag/gas; solid state bonding; electron beam; laser; thermit; and metal flame spraying. Metals: structure; properties; heat treating; destructive testing; and nondestructive testing.

* * * *

Welding Processes

Roden, E.M., & Briggs, C.W. Albany, N.Y.: Delmar Publishers, Jan. 1978, 245 pp. 2nd Edition. Hardcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)

....	$15.00
Instructor's Guide......................................	$1.60

Students become familiar with the basic welding skills. Current technical information and numerous illustrations of the modern welding techniques and equipment are included. New material has been added to improve the M.I.G. welding units and the student work projects have also been added to and improved. The accompanying Instructor's Guide contains more than 200 review questions for evaluating student comprehension and performance.

Partial Contents:

Oxy-acetylene welding-37 units; Arc welding-28 units; T.I.G. and M.I.G. welding-10 units; Metallurgy and the welding industry; Employment opportunities in welding; Work projects; Glossary; Acknowledgements; and an Index.

* * * *

Welding Processes and Power Sources

Pierre, E.R. Appleton, Wis.: Power Publications Co., 1974, 410 pp. 2nd Edition. (McAinish & Co. Ltd., Toronto, Ont.)

	$20.00
Study Guide and Workbooks	$10.50

The most often used welding processes in the metal industry are covered.

Contents:

Some basic concepts of welding; Oxygen-acetylene welding process fundamentals; Communication with common terms; Welding metallurgy fundamentals; Electrical fundamentals; Welding power source transformers; Power factor; Shielded metal arc welding; AC transformer welding power sources; Rectifiers for welding power sources; AC/DC and DC transformer-rectifier power sources; Key circuits used in some DC and AC/DC power sources; Trouble-shooting some DC power sources; Gas tungsten arc welding; Tungsten electrodes; High frequency systems; Power sources for gas tungsten arc welding; Gas metal arc welding; Shielding gases and electrodes; Welding power sources for gas metal arc welding; Welding processes' comparison and use; Rotating-type welding power sources; Special welding processes; and Data Charts.

* * * *

Welding Skills and Practices

Giachino, J.W., & Weeks, W.R. Chicago, Ill.: American Technical Society, Don Mills, Ont.)

	$11.00
Instructor's Guide	$1.00
Instructor's Answer Key	Free
Student's Guide, 116 pp	$3.00
Student Activity Manual, 219 pp. Softcover	$8.00

This easy-reading text gives complete coverage of up-to-date welding practices. The Student Guide helps students test their knowledge through a series of "self-check" questions, followed by more specific examinations. The Student Activity Manual instructs the students in the six areas of welding by emphasing the mastery of the welding skills. Each of the 60 lessons includes a study or "job" assignment and a quiz.

Contents:

Oxy-acetylene welding: equipment; safe working practices; setting-up; operating; flat position and others; heavy steel plate; stainless steel; gray cast iron; aluminum; oxy-mapp, oxy-hydrogen; and air-oxygen. Shielded metal-arc welding: machines; accessories; electrodes; striking the arc; running continuous beads; positions - flat, vertical, and overhead; cast iron; carbon steels; alloy steels; and nonferrous metals. Gas shielded arc welding: gas tungsten arc (T.I.G.); T.I.G. spot welding;

gas metal arc (M.I.G.); and related M.I.G. welding processes. Special welding processes: carbon arc; brazing; surfacing; pipe welding; cutting operations; production welding; underwater cutting and welding; and plastic welding. Supplementary welding data: testing welds; reading weld symbols; metric system; and certification of welders.

* * * *

Welding Technology

Instructional Materials Laboratory, University of Missouri-Columbia. Columbia, Mo.: Author, 1970, 123 pp.

(COE-32-S)	$3.00
(COE-32-K) Instructor's Guide	$1.50

The guide contains 26 assignment sheets with information including: welding occupation

Contents:

Welding occupations; Oxy-acetylene welding; Arc welding; Resistance welding; Special welding processes; Automatic welding and cutting equipment; Welding symbols; etc.

* * * *

Welding Technology

Kennedy, G.A. Indianapolis, Ind.: Howard W. Sams & Co., Inc., 1974, 704 pp. Hardbound. (Lenbrook Industries Ltd., Scarborough, Ont.)

(20946)	$21.00

A comprehensive overview of the many welding processes available is presented. The book provides practical experience and knowledge for procedures that are beneficial to new and experienced welders.

Contents:

Introduction; Metallurgy and metallography; Alloying elements; Welding heat effects; Design; Safety; Oxygen-gas welding; Oxygen-gas accessories; Flame cutting; Arc welding; Electrodes; Common welding techniques; Arc cutting; T.I.G. welding; Gas metal-arc welding; Pipe welding; Hardsurfacing; Low-temperature welding processes; Weld testing; Welding with metric measure; and a Glossary.

* * * *

II

GAS AND ARC WELDING PACKAGED COURSES

SOUDAGE À L'ARC ET AU GAZ COURS

INTRODUCTION AND PROCESSES

Canadian Welding Society, Weston, Ont.

Complete Course	$55.00
Book I (Course I)	$20.00
Book II (Course II)	$20.00

Book I (Course I), Exercises, Final Exam, Certificate/Book II (Course II)

The two books form the basis for the Canadian Welding Society's Correspondence Courses I and II. There is one exercise for each chapter which the student writes and sends in for correction. When all the exercises have been completed, the student writes the Final Exam (Course I only) and sends it in.

Book I: *Introduction to Welding Technology*

This book contains the information required of a welding foreman or inspector.

Contents:

Cutting steel by the oxygen fuel process; Brazing and braze welding; Welding symbols; Manual arc welding joint designs; Arc welding electrodes; Quality control of arc welding; Safety and he health in welding and cutting; Pre- and post-heating welding tools; Warpage and distortion; Steel; North America Steel and Specifications; and Cast iron.

Book II: *Productivity - Metals - Testing of Arc Welding Processes Processes*

This book brings the knowledge of the student to what is required of a welding technician.

Contents:

Welding cost calculations; Tests and testing of materials; Nondestructive testing; Electric principles and power sources; Gas metal arc and flux-cored welding; Productivity and costs in arc welding; Welding specifications and applications; Submerged arc welding; Tungsten inert gas welding; Electroslag; Plasma; Electron beam; Welding of stainless steels; and Welding copper and copper alloys.

Prerequisite: 10th Grade Mathematics and some welding experience.

* * * *

MAINTENANCE WELDING COURSE 1505

TPC Training Systems, Barrington, Ill. (Electrolab Inc., Belleville, Ont.)

(1505) Complete Course	$70.00
(117)	$17.00
(118)	$16.75
(119)	$16.75
(120)	$16.75
Supplementary Unit	$20.50

Complete Course: 20 Lessons/Supervisor's Instruction Guide/Course Management Material/Unit Test/Answer Key/Automatic Answer Key/Progress Chart/Completion Certificate

1. *Welding Principles (Understanding the Basics of Gas and Arc Welding* (117)

   10 Hrs., 80 pp.

   Lesson 1: Fundamentals of Welding

   The working of metals; Fusion welding; Common maintenance welding processes; Oxy-acetylene (gas), shielded metal arc (stick), gas metal arc (M.I.G.), and gas tungsten arc (T.I.G.) welding; Production welding processes; Resistance welding; Types of welded joints; Types of welds; Identifying weld parts; and Joint design and fit-up

   Lesson 2: Gas Welding Equipment

   The gas welding process, equipment and accessories; Oxygen, acetylene, regulators, hoses, torch, tips; Regulators control gas pressures; Welding gas hoses; Welding torches and tips; Lighting the torch; Filler rods; Personal protection; Preparing to weld; Adjusting for a neutral, oxidizing, or carburizing flame; Making a weld; Shut-down procedures

   Lesson 3: Arc Welding Equipment

   Comparing gas and arc welding; Welding with electricity; Striking an arc; Arc voltage; Open-circuit voltage; Polarity; AC and DC welding currents; DC straight polarity (DCSP); DC reverse polarity (DCRP); Constant current welding power sources; Constant voltage power supplies; Welding machine duty cycle and current ratings; AC welding machines; DC welding machines; AC/DC welding machines; Welding cables; Electrode holders; Stick holder, T.I.G. torch, M.I.G. gun; Electrodes for arc welding; Consumable stick electrodes; Non-consumable tungsten T.I.G. electrodes, continuous consumable wire M.I.G. electrode; Arc welding accessories; Helmet, goggles, gloves for protection.

Lesson 4: Welding Techniques

Selecting a welding process; Welding positions; Flat, horizontal, vertical, and overhead welding; Gas, arc, stick, M.I.G., T.I.G. welding preparations and procedures; and How to develop practical welding techniques.

Lesson 5: Avoiding Weld Faults

Proper welding procedures; Consider the welding variables; Base metal, electrode, current, position, fit-up, arc length, and travel speed; Common weld faults and problems; Arc blow and arc hard to start; Shape and dimensional problems; Overlap or undercut; Internal defects; Blowholes, inclusions, porosity; The effects of heat, internal stresses, distortion, warpage; Controlling expansion and contraction with preheating and post-heating; Identifying metals; and Spark patterns generated by grinding metals.

2. *Gas Welding Practices (Maintenance Applications of Oxy-acetylene Welding, Cutting and Brazing)*

10 Hrs., 80 pp.

Lesson 1: Welding Ferrous Metals

Fusion welding with a gas flame; A typical gas welding outfit; Other uses for the gas flame; Braze welding and torch brazing; Fluxes; Gas flame characteristics; The carburizing, neutral, and oxidizing flames; Controlling temperature in weldments; Preheat and post-heat treatments; Welding common mild steels; Stainless steel; Cast iron and wrought iron.

Lesson 2: Welding Nonferrous Metals

Gas welding characteristics of aluminum; Aluminum alloys, designations, weldability; Joint preparation, cleaning, machining, notching; Aluminum welding procedures, pre-heating, applying flux; Filler alloy selection; Copper and copper alloys; Welding copper; Joint spacing; Welding brass, bronze, lead, nickel, magnesium; General gas welding instruction for nonferrous metals.

Lesson 3: Oxygen Cutting

The oxygen cutting process; Oxidation; Cutting torch and controls; Cutting tips; Pre-heat flames and cutting jet; Safety; Hazardous spray of sparks; The cutting operation, mark cut line, pre-heat, introduce cutting jet; Cutting bevels; Piercing holes; Cutting rivets; Special rivet cutting tips with offset nozzle and special orifice arrangement; Gouging and scarfing; Removing surface defects; Iron or steel as cutting catalysts;

and Summary of cutting procedures.

Lesson 4: Brazing and Soldering

Brazing and braze welding; Base metal not melted; Capillary attraction; Tinning; Brazing filler alloys and fluxes, brass, or bronze rods, powder, liquid, paste fluxes; Fluxes remove oxides; Braze welding cast and malleable iron; Brazing aluminum; Alloy melting zone; Solids and liquids; Brazing stainless steel; Silver brazing; Safety precautions; Principle hazards, fluxes, fumes; Soldering; Chemical (metal/solvent) bond; Types of solder; Preparing to solder, clean surface, apply flux; Soldering irons and guns; Soldering procedures, pre-heat, apply flux, melt solder; Sweat soldering copper tube joints.

Lesson 5: Surfacing Techniques

Surfacing processes; Special thermal spraying processes; The detonation-gun, plasma (gas/arc), and electric arc spraying processes; Hard facing welds; Torch hard facing procedures; Flame spraying; Surfacing materials; Surface preparations; Thermal spraying shaft repairs; Other thermal spraying applications; and Safety considerations.

3. *Arc Welding Processes (Set-Up and Operation of Arc Welding Equipment Used in Maintenance)* (119)

10 Hrs., 80 pp.

Lesson 1: Shielded Metal-Arc Welding (SMAW)

How the process works; Welding voltage and current; Arc length; Polarity; Power sources; Welding machines; Tools and accessories; Selecting an electrode; Equipment set-up and operation; and Personal protection for welding.

Lesson 2: Selecting Electrodes for SMAW

Electrodes for shielded metal-arc welding; Identification of electrodes; Current ranges; Electrode coverings; Electrode selection; Commonly used electrodes; Handling, storage, and conserving electrodes.

Lesson 3: Gas Metal-Arc Welding (GMAW) and Wire Electrodes

The gas metal-arc process; Comparing GMAW to SMAW; Metal transfer methods: open arc, spray, pulsed current, globular, short circuit; Shielding gases; Electrode wire; Equipment and accessories; GMAW gun operation; Preparing to weld; How to stop welding; Welding conditions and variables.

Lesson 4: Gas Tungsten-Arc Welding (GTAW) and Tungsten Electrodes

The gas tungsten-arc welding process; GTAW equipment; GTAW welding machines and current; GTAW torches; Electrodes for GTAW; Shaping tungsten electrodes; Shielding gases; Filler metals; Preparing to weld; Welding procedures; Adding filler metal; Techniques for welding common metals: carbon steels, aluminum, stainless steels, cast iron, copper and copper alloys; GTAW spot welding; Safety practices.

Lesson 5: Other Welding Processes

Resistance welding: spot, seam, and projection; Flash welding; Upset welding; Percussion welding; Flux-cored arc welding; Submerged arc welding; Plasma arc welding; Stud welding; Electron beam welding; Laser beam welding; Friction welding: conventional, inertia, and flywheel; and Ultrasonic welding.

4. *Arc Welding Practices (Maintenance Applications of Arc Welding Techniques)* (120)

10 Hrs., 80 pp.

Lesson 1: Pre-heating and Post-heating

Why pre-heating?; Stress; Changes in mechanical properties; Why post-heating?; When do you pre-heat?; Composition of the base metal; Part thickness; Part shape; Type and size of electrode; Welding process; When do you post-heat?; Composition and thickness of base metal; Part shape; Pre-heating and post-heating equipment; Furnaces; Temporary enclosures; Pre-heating and post-heating torches; Pre-heating methods; Consider shape when pre-heating; Spot pre-heating; Post-heating methods; Consider shape when cooling.

Lesson 2: Welding Ferrous Metals

What are ferrous metals?; Cast irons; Carbon steels; Alloy steels; Effects of production on carbon steels; Effects of rolling on carbon steels; How to identify ferrous metals; Edge preparation; Welding cast irons; Welding cast irons with SMAW; Welding carbon steels; Welding low-carbon steels with GMAW; Welding alloy steels; Low-hydrogen welding procedures for alloy steels.

Lesson 3: Welding Nonferrous Metals

What are nonferrous metals?; Aluminum; Stainless steel; Nickel Copper; Production types of nonferrous metals; How to identify nonferrous metals; Edge preparation; Air carbon-arc cutting; Oxygen-arc cutting; Shielded metal-arc cutting; Gas metal-arc cutting; Gas tungsten-arc cutting; Plasma-arc cutting; Carbon-arc cutting; Cleaning; Welding aluminum; Welding stainless steel: Welding nickel; and Welding copper.

Lesson 4: Pipe Welding

Types of piping systems and joints; Pipe welding codes and qualification; Metal pipe materials and applications; Pipe sizes; Pipe repair safety; Arc welding processes; Gas welding processes; Types of welding joints; Edge preparation and fit-up; Pre-heating and post-heating; and Pipe welding procedure.

Lesson 5: Hard Facing and Rebuilding

Surfacing; Uses of hard facing and rebuilding; Types of wear; Types and uses of surfacing alloys; Base metals; Preparing the base metal; Pre-heating; Surface bonding; Oxy-acetylene hard facing; Manual arc hard facing; Semi-automatic hard facing; Automatic hard facing; Thermal spraying; and Hard facing patterns.

Supplementary Unit: *Characteristics and Uses of Metals and Alloys for In-Plant Applications*

10 Lessons, 20 Hrs.

This unit can be used as an addition to the 4-unit course. It provides 20 hours of self-instruction.

Contents:

Physical structure of metals; Properties of metals; Heat treatment; Manufacturing processes; Iron; Steel; Aluminum; Magnesium and titanium; Copper; Lead, nickel, tin, and zinc.

Recommended Levels: College and Training School

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III

ARC WELDING
PRINT MATERIALS

SOUDAGE À L'ARC
MATÉRIEL IMPRIMÉ

Arc Electrode Manual

Jefferson, T.B. Lake Zurich, Ill.: Monticello Books, 1975, 72 pp. Softcover. (Hobart Bros. Canada Ltd., Woodstock, Ont.) (EW-393)..$4.00

This book contains data on the commonly-used electrodes with the fundamental differences fully explained. The arc and coating characteristics, costs, deposition rates, and anticipated speeds are included, as well as tables and charts to help determine electrode requirements and filler metal deposition weights for the various welding conditions. M.I.G. wires and submerged fluxes are also covered.

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Arc Welding

Giachino, J.W. Chicago, Ill.: American Technical Society, 1977, 163 pp. (General Publishing Co. Ltd., Don Mills, Ont.) (ATS/01)..$6.00

This book is intended for beginners. It deals specifically with the welding principles and practices in the areas of: shielded metal arc; gas tungsten arc (T.I.G.); and gas metal arc (M.I.G.). Each of the 15 units includes the basic information which welding students should know. The Self-Quiz following each unit is designed to help students find out how well they understand the welding principles. Most units also contain a variety of welding assignments which are intended to give students an opportunity to develop welding skills. This book may be effectively utilized for a short term, basic course in arc welding.

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Arc Welding

Walker, J.R. South Holland, Ill.: The Goodheart-Willcox Co., Inc., 1973, 128 pp. (General Publishing Co., Ltd., Don Mills, Ont.)
....$5.00

The basic fundamentals are presented in an easy-to-understand manner. Extra colour is used throughout for emphasis and to clarify important details. The write-in feature of the text along with the functional organization and layout, permits the student to progress at his own pace. It also enables the instructor and the students to evaluate the students' work and correct any problems as they are encountered. Questions and activities at the end of each unit assist students in determining how well they understand the related information that a welder must know.

This book is intended for a six-, nine-, or eighteen-week arc welding program for beginning students.

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Arc Welding Instructions for the Beginner

Sosnin, H.A. Cleveland, Ohio: James F. Lincoln Arc Welding Foundation, 1964, 160 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$2.75
Instructor's Manual.......................................$1.25
Instructor's Manual is free with an order of 10 or more copies of the text

The basic arc welding skills are covered. The mastery of each lesson is one step toward learning how to arc weld in all positions. The discussions concentrate on describing the manipulative skills for the basic weld types: fillet, lap and butt welds in the various positions; and flat, vertical, overhead and horizontal welds. The technical discussions on process applications, the types of electrodes and machines; and basic metallurgy are intentionally brief. Most of the 27 basic lessons of the 21 chapters provide for two-hour periods. The 58-page Instructor's Manual outlines in detail 25 classroom presentations. Each class session covers a specific chapter in the book. Detailed descriptions of these sessions list the objective, equipment and material, suggest a time schedule, and summarize material presentations for Introduction, Discussion, Demonstration, Review, Summary, and Next Lesson Assignment. There is margin space for "teacher's notes". The outlined presentations and type style and size enable the teacher to conduct classes directly from the manual minimizing the time spent making lesson plans.

Contents:

What is welding; Arc welding; Safe practices; Striking an arc; Running a bead; Heat measurement, whipping, and weaving; Oxy-acetylene cutting; Fillet welds; Corner welds; Butt welds in the flat position; Butt welds in the inclined position; Welds in the vertical position; Fillet welds overhead; Welding overhead on flat plate; Butt welds overhead; Fillet welds with joint horizontal; Butt welds in the horizontal position; Welding in all positions; Welding with poor fit-up; Welding procedures; and Testing and inspection.

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Arc Welding Lessons for School and Farm Shop

Kugler, H.L. Cleveland, Ohio: James F. Lincoln Arc Welding

Foundation, 1957, 343 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(AWL)..$3.00

Eight information lessons and six skill lessons introduce both high school and college students to the basic techniques for arc welding in all positions--flat, vertical and overhead. Later lessons deal with special skills as hardsurfacing, welding cast iron, and others. Each chapter is complete in itself, but if studied in sequence, the chapters make a complete course. Each one features a teaching guide with outlines for the lesson; points out clearly the objective of that particular lesson; and lists the key points, materials needed and suggestions for jobs. Illustrations, photographs, exercises, and projects are included.

Contents:

Part I: Selecting and caring for arc welding equipment; controlling distortion; selecting welding electrodes; and operating the carbon arc torch. Part II contains 17 operational lessons for developing skills in arc welding, cutting, brazing, soldering, and hardsurfacing. Part III: Shop projects and index.

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Basic Arc Welding

Griffin, I.H., Roden, E.M., & Briggs, C.W. Albany, N.Y.: Delmar Publishers, 1977, 88 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$4.75
Instructor's Guide.......................................$ .65

This newly revised, highly illustrated text-workbook teaches students the fundamentals of electric arc welding by the "hands-on" application. Each unit covers every aspect of welding with an electric arc. Basic background information is provided in a step-by-step format for students who complete the procedural units. New illustrations and photographs replace line drawings. The answers to all the unit-end review questions are in the Instructor's Guide.

Contents:

The arc welding process; Sources of electricity for welding; The welding circuit; Fundamentals of arc welding; Welding symbols; Starting an arc and running stringer beads; Running continuous stringer beads; Running weave beads; Padding a plate; Single-pass, closed square butt joint; Open square butt joint; Single-pass lap joint; Single-pass fillet weld; Multiple-pass lap joint; Multiple-pass fillet weld; Weaving a lap weld; Weaving a fillet weld;

Beveled butt joint; Outside corner weld; Outside corner and fillet welds (heavy-coated rod); Deep groove weld (heavy-coated rod); Reverse polarity welding; Low-hydrogen electrodes; Horizontal welding; Overhead welding; and Vertical welding.

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Choosing Electrodes (603-A)
Striking an Arc (603-B)
Welding Currents (603-C)
Running a Bead (603-D)
Flat Position Welding (603-E)
Basic Welding Joints (603-F)
Horizontal Bead (603-G)
Vertical Bead (603-H)
Common Causes of Welding Problems (603-I)

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author.
....$ .38 Each

The above are learning modules.

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Dispositions recommandées d'assemblages soudés à l'arc pour construction d'appareils en acier plaqué

Bergeaux, H. 75880 Paris, CEDEX 18: Publications de la Soudure Autogène, 24 pp.

Généralités; Assemblages de tôles-acier plaqué simple; Assemblages de tôles-acier plaqué double; Assemblages spéciaux sur tôles ou tubes d'aciers plaqués simples; Fixation d'organes connexes sur les récipients à pression en acier plaqué.

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Ferblanterie, soudure

Bélisle, L.-A. Montréal, Québec: Librairie Beauchemin Ltée., 1968, 498 pp.

Sommaire:

Travail au métal en feuilles: pliage, cintrage, nivelage, bros-

sage, etc.; Soudure à l'oxyacétylène et à l'électricité.

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Guide du soudage - Tome IV: Soudage manuel à l'arc

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 350 pp.

Définitions et notions fondamentales; L'arc électrique; Le courant de soudage; Sources de courant pour le soudage à l'arc; Appareils de soudage manuel à l'arc; Choix d'un appareil; Raccordement au réseau; Entretien des appareils, dépannage; Préparation des joints; L'atelier de soudage manuel; Outillages et montages; Mode opératoire: aciers au carbone, aciers faiblement ou fortement alliés, aciers plaqués et doublés, aciers galvanisés, cuivre, aluminium, nickel et leurs alliages; Réparations; Soudage et coupage à l'électrode de carbone; Défauts des soudures; Contrôle; Traitements; Conseils de sécurité; Soudage à l'arc.

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Manual of Arc and T.I.G. Welding

Sellon, W.A., Matthews, J.W., & De Freitas, L. Cleveland, Ohio: James F. Lincoln Arc Welding Foundation, (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$1.50

The students are introduced to the fundamentals of arc welding with this brief, non-technical manual. It is ideal for a short course and self-instruction programs. Included in the manual is a section for beginners to learn T.I.P. welding techniques and manipulative skills that they can use later in specific industrial projects.

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Modern Arc Welding Procedures and Practice

Hobart School of Welding Technology. Troy, Ohio: Author, recent, 544 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-200)..$6.00

This practical welding handbook contains a complete arc welding test and lessons covering every stage of arc welding.

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New Lessons in Arc Welding

James F. Lincoln Arc Welding Foundation. Cleveland, Ohio:
Author, 163 pp. (Lincoln Electric Co. of Canada Ltd.,
Toronto, Ont.)
....$3.00

This book includes material on the latest arc welding techniques, machines, and electrodes. The lessons, simply written, cover manipulatory techniques; machine and electrode characteristics; related subjects such as distortion; and supplemental information on arc welding applications, speeds and costs. Practice materials, exercises, and questions and answers are suggested for each lesson. The book is illustrated with pictures and drawings.

Contents:

Part I contains 47 lessons on how-to-weld, "running a straight bead", "running vertical up beads", pipe welding, safety; distortion, arc, blow, hardsurfacing, and welding copper. Part II contains seven lessons on arc welding machines with instructions on how to start and stop them, set the controls, and properly care for them. Part III contains 17 lessons on all types of mild steel electrodes with considerable attention given to the proper electrode selection for a particular job. Parts IV, V, and VI describe stainless steel, hardsurfacing, and cast iron and non-ferrous electrodes in presentations similar to Part III. Part VII provides supplemental information on how to identify metals, the best procedures for low cost welding, testing procedures, and welding symbols.

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Pocket Welding Guide

Hobart School of Welding Technology. Troy, Ohio: Author.
(Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-452)..$1.00

This small paperback book contains welding terms and symbols, welder qualifications, electron selection factors, a weld troubleshooting guide, examples of good and bad welds, and tables hat aid in the identification of metals.

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Prévision et compensations des déformations dues au retrait en soudage électrique à l'arc

Gerbeaux, H., & Renault, J.-P. 75880 Paris, CEDEX 18:

Publications de la Soudure Autogène, 1968, 75 pp.

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The Procedure Handbook of Arc Welding Design and Practice

James F. Lincoln Arc Welding Foundation. Cleveland, Ohio: Author, 1973, 800 pp. 12th Edition. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$6.00

Written for those without an extensive welding background, this book emphasizes the welding processes and procedures. Cost factors and case histories are intersperced throughout.

Contents:

Introduction and fundamentals; Designing for arc welding; Variables in welding fabrication; Consumables and machinery; Welding processes; Welding carbon and low alloy steel; Welding stainless steel; Welding cast iron and cast steel; Welding aluminum and aluminum alloys; Welding copper and copper alloys; Quality control; Welding costs; Special applications; Installation and maintenance; Safety in welding; Reference section; and Index.

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Qualified Welding Procedures

Hobart School of Welding Technology. Troy, Ohio: Author, recent. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-281)..$2.00

The qualified welding procedures for welding under various code requirements are covered.

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Sense and Nonsense of Weld Defects

Thielsch, H. Lake Zurich, Ill.: Monticello Books, 1967, 48 pp. Softcover. (Canadian Welding Society, Weston, Ont.)
....$3.65

This is a guide to detecting defects which commonly occur during welding, and what to expect as a result of these imperfections.

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Test Preparation Book for the Welder

Mafex Associates, Inc. Johnstown, Penna.: Author. (Niagara Publishers, Fenwick, Ont.)
(7V-AJ0051)..$5.00

This book help students prepare for the job they are training for. It gives sample questions and problems encountered on actual tests. The job of the the welder, as well as sections on welding materials, welding design, joining of various materials, surfacing, and metalizing are covered.

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Using the Individualized Learning Package (W3000-2)
Introduction to Metal Arc Welding (W3001-1)
Work Habits (W3001-2)
Metal Arc Welding Equipment (W3001-3)
Arc Welding Terms and Definitions (W3001-4)
Metal Arc Welding Safety (W3002)
Power Supplies (W3003)
Electrode Identification for Mild Steel (W3004)
Electrode Selection Application for Mild Steel (W3005)
Mild Steel Electrode Coatings (W3006)
Five Essentials of Arc Welding (W3007)
Basic Weld Joint Design (W3008-1)
Welding Positions (W3009)
Welding Symbols (W3010)
Metallurgy-Identification of Types of Metals (W3011-1)
Metallurgy-Mechanical Properties of Metal (W3011-2)
Metallurgy-Mechanical Testing of Welds (W3011-3)
Welding Problems (W3011-4)
How to Start and Maintain an Arc-Flat Position (W3101-1)
Lay Continuous Beads-Flat Position (W3101-2)
Run Wash Beads to Width Dimensions-Flat Position (W3101-3)
Fillet Weld-Flat Position (W3102)
Butt Joint-Square Groove Flat Position (W3104-1)
How to Weld a Butt Joint-Vee Groove-Flat Position (W3104-2)
Outside Corner Weld-Flat Position (W3106)

Continuous Beads (Padding)-Horizontal Position (W3201-2)
How to Make a Fillet Weld-Horizontal Position (W3202)
How to Make a Fillet Weld-Horizontal Position with Wash Beads (W3202-1)
Butt Joint-Square Groove-Horizontal Position (W3204-1)
How to Make a Butt Weld-Vee Groove-Horizontal Position (W3204-2)
Outside Corner Joint-Stringer Beads-Horizontal Position (W3206)
Continuous Bead Pad-Overhead Position (W3301-2)
Fillet Weld-Closed Corner Joint-Overhead Position (W3302)
Butt Joint-Square Groove-Overhead Position (W3304-1)
How to Weld a Butt Weld-Vee Groove-Overhead Position (W3304-2)
Butt Joint-Weave and Wash Bead without Backup Strip-Overhead Position (W3304-3)
Outside Corner-Overhead Position (W3306)
Continuous Bead (Padding)-Vertical Position (W3401-2)
Inside Corner Joint-Fillet Weld-Vertical Position-Stringer Beads (W3402)
Butt Joint-Square Groove-Vertical Position (W3404-1)
How to Weld a Butt Joint-Vee Groove-Vertical Position (W3404-2)
Butt Joint-Wash and Weave Bead-Vertical Position-without Backup Strip (W3404-3)
Outside Corner Weld-Vertical Position (W3406)

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author. ....$ .38 Each

The above are learning modules.

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Welding: Glossary of Key Words

Brunt, J.G. Pontiac, Mich.: Oakland County School, Nov. 1972, 106 pp. (ERIC Document Reproduction Service, Arlington, Va.)
(ED 086 857) Hardcopy.....................................$6.58
Microfiche..................................$ .65

This glossary was designed to assist students in vocabulary mastery for particular vocational education courses. It is divided into two parts: one provides the student with two definitions for each term listed; the second part lists the same words with space for the student's definition.

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Welding Craft Practice. Part I, Volume 2: Electric Arc Welding and Related Studies

Parkin, N., & Flood, C.R. Toronto, Ont.: Pergamon Press of Canada Ltd., 1969, 182 pp. Softcover.

This straightforward, simple and practical book was designed to provide all the basic knowledge required for electric arc welding and related studies. It is broken down into convenient and progressive components. Where appropriate, emphasis has been placed on safety training.

Contents:

Plant, procedure and equipment: A.C. plants; D.C. plants; Selection of current values; Workshop layout; Ancillary equipment; Safety precautions; and Electrodes and electrode classification. Method: Striking and maintaining the arc; Correct run and faults; Butt welds in mild steel; Open corner welds; Tee and lap joints; Weaving; Butt welded joints in pipes; Vertical welding techniques; and City and guilds work. Special techniques: Building up worn parts; Electric arc welding cast iron; Welding procedure; Carbon arc welding; Atomic hydrogen welding; Gas-shielded processes; Argon arc process; and Cutting. Heat and temperature: Heat; Temperature; Heat transfer; and Expansion. Elementary electricity: The electric circuit; Production of electricity; Resistance; Electrical power and energy; Electromagnetic induction; and The electric arc. Engineering drawing: Equipment; Straight-line constructions and scales; Projection; Welding terms and symbols; and Surface development. Mathematics: Fractions; Decimals; Percentages; Ratio and proportion; Area; Volume; and the Metric System. Glossary of welding and general terms and abbreviations. Revision questions. Index.

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Welding Guide

UTP Welding Materials of Canada Ltd. Downsview, Ont.: Author, 176 pp.

This 6" x 5" guide contains numerous recommendations as to the uses and applications of particular products, proven techniques and welding hints.

Contents:

General application chart; Cast irons; Aluminum, magnesium, titanium; Copper and copper-base alloys (and silver solders) white metal; Nickel and nickel alloys (INCONEL, MONEL, etc.); Carbon-, alloy and stainless steel; Hardfacing and tool steel welding; UTP fluxes and special products; UTP welding wires; Powder spray torches; Shielded metal arc welding; Technical information; Index and description of all UTP alloys.

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Welding Power Handbook

Union Carbide Canada Ltd. Toronto, Ont.: Author, 1973, 208 pp. Hardcover.
(674401)..$7.15

A comprehensive treatment of the welding subject from the simple definition of an arc to power supply construction and operation is provided. An extensive technical background is not necessary to understand the information presented, however, some knowledge of physics and electricity will be helpful. The book is divided into two parts. The first section discusses electrical theory, reviewing the fundamentals necessary for understanding the operation of arc welding systems (basic electrical model concepts, direct current, single-phase, and three-phase alternating current, arc characteristics, and electrical models). The second part of the book considers the practical application of these fundamentals, covering in full detail each of the power supplies used for the various electric welding processes (stick electrode, T.I.G., M.I.G., short arc, plasma arc, and submerged arc).

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Welding Power Handbook

Manz, A.F. Miami, Fla.: American Welding Society, recent, 208 pp. (Canadian Welding Society, Weston, Ont.)
(WPH)...$6.00

This is a basic manual on the theory and use of arc welding power supplies.

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Welding Procedures: Electric Arc

Schell, F.R. Albany, N.Y.: Delmar Publishers, 1977, 130 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$4.75
Instructor's Guide..$1.60

This is an advanced, self-instructional work-textbook that features behavioral objectives, hands-on procedures, related technical information, and unit-end reviews. Students learn the how-to-procedures, them move into more complex, technical welding proprocedures. Covered are safety rules; flat horizontal, vertical and overhead welds; mild steel; and sheet metal. All jobs have destructive tests. The answers to unit-end reviews, added questions, and a comprehensive test are in the Instructor's Guide.

Welds in the flat position: Setting up arc welding equipment; General arc welding safety rules; Striking an arc; Straight beads, flat position; Etching welds in mild steel; Weave beads, flat position; Fillet welds, flat position; Butt welds, flat position; Comprehensive review. Welds in the horizontal and vertical positions: Stringer beads, horizontal position; Lap welds, horizontal position; Butt welds, horizontal position; Stringer beads, vertical position; Lap welds, vertical position with weave bead; Fillet welds, vertical position; Padding a plate with vertical and horizontal beads; Butt welds, vertical position with weave beads; Comprehensive review. Welds in the overhead position: Stringer beads; Overhead position; Pad buildup, overhead position; Weave beads, overhead position; AC welding, overhead position; Fillet welds, overhead position; Butt welds, overhead position; Comprehensive review. Welding in mild steel sheet metal: Welding mild steel sheet metal, vertical-down; Outside corner in sheet metal, vertical-down; T-welds in mild steel sheet metal, vertical-down; Mild steel sheet metal, flat position; Outside corner weld in sheet metal, flat position; Comprehensive review. Final review projects. Glossary.

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IV

ARC WELDING
NON-PRINT MATERIALS

SOUDAGE À L'ARC
MATÉRIEL NON IMPRIMÉ

ARC WELDING SERIES

The Safe Welder (ZEA001)
Efficient Arc Welding Habits (ZEA002)
Iron Powder Electrodes (ZEA003)
Setting the Arc Welding Machine (ZEA004)
Correct and Incorrect Polarity in Arc Welding (ZEA005)
How to Build a Pad in Welding (ZEA006)
Making a Fillet Weld in the Horizontal Position (ZEA007)
Running a bead with the Whipping Motion (ZEA008)
Making a Butt Weld in the Horizontal Position (ZEA009)
Running a Bead in the Vertical Position: Welding Up (ZEA010)
Running Overhead Beads (ZEA011)
Restarting the Bead (ZEA012)

DCA Educational Products, Warrington, Penna. (EICO Canada Ltd., Richmond Hill, Ont.)

(ZEA000)	$354.00/Set
	$29.50 Each
Film Loops Only (substitute an F for a Z in the catalogue number)	$22.00 Each
Tape Cassettes Only (substitute a C for a Z in the catalogue number)	$ 8.25 Each

Super 8mm Colour Film Loops/Tape Cassettes. Cartridges are in Technicolour only. Cassettes fit any standard cassette player.

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BASIC ELECTRIC ARC WELDING

Jam Handy Organization, Detroit, Mich. (Prentice-Hall of Canada Ltd., Scarborough, Ont.)

(KDJH2915)	$413.00/Set
Film Loop/Cassette	$35.00 Each
Film Loop	$28.00 Each
Cassette	$7.00 Each

Super 8mm Colour Film Loops/15 Cassettes/Instructor's Guide

Each loop shows two basic manipulative patterns for welding a given joint. Many of the visuals are shot from the perspective of the welder so students feel that they are looking over the welder's shoulder through his eye shield. Each loop may be purchased with a non-synchronized sound cassette. On each cassette, a welder on site describes precisely what is occurring in the loop as would be found in an actual shop situation. An introductory cassette describes exactly how to use the cassettes with the continuous loops.

1. *Starting the Arc* (KDJH2901)

The correct procedure for starting and breaking the arc is shown.

2. *Padding a Plate* (KDJH2902)

   This loop shows running first and second beads, the importance of keeping work cool, and maintaining a steady travel speed.

3. *Square Edge Butt Weld* (KDJH2903)

   The proper setup of work, the motion pattern in first pass, and the continuous bead in second pass with final bead on back side are demonstrated.

4. *Flat T Fillet Weld* (KDJH2904)

   The method for working toward a uniform ripple pattern and a flat contour between plates and the proper arc moves during the second pass are described.

5. *Positioned Flat Fillet* (KDJH2905)

   The setup is related to the Standard T fillet. The continuous first pass versus the motion pattern on the second pass-C shaped arc travel pattern is shown.

6. *30^oDegrees V-Butt Flat Weld (Part I)* (KDJH2906)

   The proper welding of two pieces whose setup has a 1/8" root opening at the bottom of the V is demonstrated.

7. *30-Degrees V-Butt Flat Weld (Part II)* (KDJH2907)

   Part I is continued showing a third pass closure and an optional stringer-bead method.

8. *Vertical Square Butt Weld* (KDJH2908)

   This loop introduces position welding where gravity is involved. The skilled welder making the most of capillary attraction through control of the arc is shown.

9. *Vertical Fillet Weld* (KDJH2909)

   A true fillet relationship is shown. The welder's aim is to get full root fusion with both first and second passes.

10. *30-Degrees V-Butt Vertical Weld* (KDJH2910)

    The proper procedure in the first and second passes plus the third-pass closure is clearly illustrated.

11. *Horizontal Square Butt-1/4" Plate* (KDJH2911)

    Getting the full penetration of the root of the weld with an arc path and timing are stressed.

12. *30-Degrees Horizontal V-Butt 3/8" Plate (Part I)* (KDJH2912)

    The setup of a test plate with 1/8" root opening and the proper method to get full penetration from the face side of the weld are shown.

13. *30-Degrees Horizontal V-Butt 3/8" Plate (Part II)* (KDJH2913)

    Part I is continued demonstrating the proper procedure in the third, fourth, and fifth passes. The proper rod angle is noted.

14. *The Overhead Fillet* (KDJH2914)

    The plate setup in a standard T relationship with the weld occurring from the bottom is shown.

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BASIC PRINCIPLES

Arc Welding Equipment

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(AT C-2A)..$18.00

Filmstrip/Audio Cassette/Worksheet

This filmstrip covers the basic principles of electric arc welding and its equipment. Also included is information on safety and electrode selection.

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BASIC PRINCIPLES

Electric Arc Welding and Cutting

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-734717)

Colour/Sound Filmstrip (77 Frames). Time: 13:34 mins.

The basic arc welding and cutting operations are illustrated. The craftsman demonstrates the various weld joints and cutting operations. Several projects are demonstrated using both DCSP and DCRP rod. The characteristics are explained for the 6012 DCSP rod and the 6010 DCRP rod.

One colour/sound filmstrip with double-sided phonodisc $28.00

One colour/sound filmstrip with audible signal cassette $30.00

One colour/sound filmstrip with 5" reel (3/4" per second) $30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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BASIC PRINCIPLES

Fundamentals of Manual Arc Welding

Airco Welding Products, Union, N.J.
(8242-0136)..$275.00

16mm Colour/Sound Motion Picture (2 Reels). Time: 40 mins.

This is a basic film on stick electrode welding. It begins by illustrating the electrode, its decomposition during welding, the equipment required to weld, and how to weld. Part I shows "how-to" on striking an arc and manipulating the arc in the flat and horizontal position. Part II goes into the "how-to" on vertical up and overhead welding.

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BASIC PRINCIPLES

DCA Educational Products, Warrington, Penna. (EICO Canada Ltd., Richmond Hill, Ont.)
....$142.50/Set

53 Multicoloured Transparencies/25 Overlays

The basic arc welding techniques and information on tools and welding symbols are covered.

1. *What is Arc Welding* (W-1)

Both edges of metal being heated by the arc and flowing together are shown. 7 colours; 2 overlays.
....$6.85

2. *Welding Ice* (W-2)

   2 colours...$1.65

3. *Steel-Ingot Weld* (W-3)

   5 colours; 1 overlay....................................$5.43

4. *Electric Furnace* (W-4)

   The techniques that are common to steel making and welding are illustrated. 3 colours.
   3 colours...$2.35

5. *Soldering* (W-5)

   3 colours...$2.35

6. *Why Weld?* (W-6)

   This gives a comparison between a rivet joint and a weld joint.
   3 Colours; 1 Overlay....................................$3.25

7. *Common Types of Welding* (W-7)

   4 colours...$2.95

8. *DC Motor Generator Welder* (W-8)

   3 colours...$2.35

9. *AC Welder* (W-9)

   3 colours...$2.35

10. *Welder's Dress* (W-10)

    2 colours...$1.65

11. *Accessories* (W-11)

    2 colours...$1.65

12. *Grounding* (W-12)

    2 colours...$1.65

13. *Polarity - DC Generator* (W-13)

3 colours; 1 overlay...................................$3.25

14. *Welding Process* (W-14)

The reaction of the electrode and the metal is illustrated. 3 colours...$2.95

15. *Colour Codes* (W-15)

Both the old and new method of marking electrodes to tell their use is shown. 7 colours; 1 overlay.............$6.00

16. *Electrode Chart* (W-16)

The vital information about the various sizes of electrodes is given. 2 colours...................................$1.65

17. *Striking the Arc* (W-17)

It is shown by the scratch method and the poke method. 4 colours; 1 overlay.....................................$3.95

18. *Picking Up Weld* (W-18)

The method for starting a weld after it has been interrupted is shown. 3 colours...................................$2.25

19. *Weaving* (W-19)

2 colours...$1.65

20. *Arc Welding Bead Faults* (W-20)

2 colours...$1.65

21. *Powdered Metal Electrodes* (W-21)

2 colours...$2.00

22. *Types of Welding Joints* (W-22)

2 colours...$1.65

23. *Arc Welding Positions* (W-23)

The flat, vertical, horizontal, and overhead positions are covered. 5 colours; 3 overlays.......................$6.50

24. *Welding Symbols* (W-24)

2 colours...$1.65

25.	*Basic Arc and Weld Symbols* (W-25) 3 colours; 1 overlay	$3.25
26.	*Cutting-A Plate with an Electrode* (W-26) 3 colours; 1 overlay	$3.25
27.	*Carbon Arc Flame* (W-27) 3 colours	$2.25
28.	*DC Welding Circuit* (W-28) 2 colours	$1.65
29.	*AWS Classification Numbers* (W-29) 5 colours; 3 overlays	$6.15
30.	*Mild Steel Electrode Selection* (W-30) 3 colours	$2.35
31.	*Electrode Movement* (W-31) 3 colours	$2.35
32.	*Terms Applied to a Weld* (W-32) 3 colours	$2.25
33.	*Porous Welds* (W-33) 3 colours	$2.25
34.	*Incomplete Penetration* (W-34) 3 colours	$2.25
35.	*Warping* (W-35) 3 colours	$2.25
36.	*Undercutting* (W-36) 3 colours	$2.25
37.	*Distortion* (W-37) 3 colours	$2.25

38. *Cracked Welds* (W-38)

3 colours..$2.25

39. *Poor Appearance* (W-39)

3 colours..$2.25

40. *Poor Fusion* (W-40)

3 colours..$2.25

41. *Brittle Welds* (W-41)

3 colours..$2.25

42. *Spatter* (W-42)

3 colours..$2.25

43. *Magnetic Blow* (W-43)

3 colours..$2.25

44. *Welding Stresses* (W-44)

3 colours..$2.25

45. *Electrode Coatings* (W-45)

4 colours..$2.95

46. *Metal Shapes* (W-46)

2 colours..$1.65

47. *Four-Pass Butt Weld* (W-47)

6 colours; 4 overlays..................................$6.95

48. *Three-Pass Fillet Weld* (W-48)

5 colours; 3 overlays..................................$6.15

49. *Lap Weld* (W-49)

3 colours..$2.25

50. *Spot Welding* (W-50)

7 colours; 3 overlays..................................$6.95

51. *Cast Iron Welding* (W-51)

3 colours..$2.25

52. *Gas Tungsten Arc Welding System (T.I.G.)* (W-52)

4 colours..$2.95

53. *Gas Tungsten Arc Welding (Torch)* (W-53)

3 colours..$2.25

Recommended Levels: Junior and Senior High School Education.

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ELECTRIC ARC WELDING EXPLAINED SERIES: BASIC PRINCIPLES #904A

Bergwall Productions, Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)
....$193.00/Set
Request Study Guide.................................$48.00 Each

5 Colour Filmstrips/5 Cassettes/Study Guide

1. *Introduction to AC Arc Welding*

The fundamentals of electric arc welding are briefly explained. The 225 amp AC welding machine is described in detail with the important features highlighted.

2. *Protective Devices and Clothing*

The proper wearing apparel is described and placed on a welder in a systematized manner. Fire prevention and personal safety practices are stressed.

3. *Striking the Arc*

The correct procedures and the necessary safety precautions are discussed when the arc is struck. The striking techniques are described as well as the sounds for recognizing a good arc length.

4. *Running the Bead*

The basic requirements for a good stringer bead are explained. Various amperage settings are used to prove how the beads are affected by the current settings. Also included is the technique of restarting a bead and the chipping and cleaning of the finished weld.

5. *Weaving a Bead*

   Five basic weave patterns are shown. Each pattern can be adapted to the various types of welding positions.

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ELECTRIC ARC WELDING EXPLAINED SERIES: POSITIONAL WELDING #904B

Bergwall Productions, Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)

....	$155.00/Set
With Requested Study Guide........................	$48.00 Each
#904A and #904B........................	$345.00

4 Colour Filmstrips/4 Cassettes/Study Guide

6. *Arc Welding in the Flat Position*

   Joint preparation and setting up the lap, tee and butt joints are explained. Electrode angles are described to illustrate how the welder should place the rod when welding in a flat position.

7. *Arc Welding in the Horizontal Position*

   The proper angles for welding in the horizontal position are shown accurately, as well as the correct electrode manipulation. Single and multiple passes are used to illustrate a good welded joint.

8. *Arc Welding in the Vertical Position*

   Downward and upward vertical welding techniques are discussed in detail. Angles and amperage settings are used to develop the correct welding methods. The proper wrist movements are demonstrated for a good weave bead.

9. *Arc Welding in the Overhead Position*

   Natural forces such as cohesion, adhesion and surface tension are described for a better understanding of how a liquid molten metal is placed in the overhead position. The body, arm, and hand positions are shown. The weaving of an overhead bead is also shown.

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ELECTRODES

Arc Welding Electrode Selection

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$150.00

16mm Colour/Sound Film. Time: 20 mins.

The factors to consider in selecting the proper electrodes are shown.

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GAS METAL ARC

The Welding Arc

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$200.00

16mm Colour/Sound Film. Time: 12 mins.

This film shows the gas metal arc in short circuiting, globular and spray transfer modes, flux-cored arc, shielded metal arc, gas tungsten arc, and plasma arc in a keyhold mode.

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GENERAL

Arc Welding

Brodhead-Garrett, Cleveland, Ohio. (EICO Canada Ltd., Richmond Hill, Ont.)
(365230 FCA011)..$235.00

16mm Colour/Sound Film. Time: 23 mins.

Safety and good habits; iron powder electrodes; setting the machine; polarity; building a pad; running a bead; fillet welds; and butt welds are explained.

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GENERAL

Arc Welding Process

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)

(AT C-3A)..$18.00

Filmstrip/Audio Cassette/Worksheet/Job Sheet

Instruction is given on the welding positions, the types of joints, safety rules, how to strike an arc, and the procedure for welding beads on a flat piece of metal.

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GENERAL

Beads of Life

U.S. Navy, Office of Information, Washington, D.C. (National Audio-Visual Center, Washington, D.C.)
(005160/JJ)..$87.00

16mm Colour Film. 1971. Time: 15 mins.

The puddle action of several types of welding--manual metal arc, gas tungsten arc, tungsten inert arc, and gas metal arc or metal inert gas is shown.

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GENERAL

Electric Arc Welding

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
(301/C5)...$25.00

Regular 8mm/Super 8mm Silent Film

A correctly laid out work station for electric arc welding is illustrated. The operation is shown being performed with attention directed to rod diameter/current setting relations, methodical deposit of weld bead, and the safe removal of solidified flux from the bead surface.

Recommended Levels: Secondary, Further, and Industrial Education.

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GENERAL

Soudage à l'arc avec électrodes enrobées (arc "E")

Publications de la Soudure Autogène, Paris, France.

Diapositives 24 x 36 ou film à vues fixes 18 x 24 (35mm) couleur. Commentaire enregistré sur cassettes avec stops 1000 Hertz.

Le programme est divisé en modules de 5 à 8 minutes, à utiliser un par un, pour déclencher la discussion de groupe. Le moniteur, spécialiste du soudage à l'arc et bon pédagogue, doit également agir en animateur de groupe. Pour préparer les séances de travail, il dispose d'un livret reproduisant les vues et le texte intégral et d'un livret pédagogique donnant, au niveau des points clés cités dans le programme, des éléments de réponse aux questions probables ou des idées de sujets complémentaires pouvant être développés, expliqués et discutés.

Contenu:	Vues
1. Appareils de soudage	18
2. Rôles de l'enrobage	18
3. Types d'enrobage	16
4. Identification des électrodes	17
5. Conservation des électrodes	20
6. Choix du courant	10
7. Avant de souder (équipment, instructions, préparation, préchauffage, intensité)	24
8. Quand on soude (amorçage et rupture, pointage, contrôle du bain, soufflage)	22
9. Les défauts des soudures	24

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THE INSIDE OF ARC WELDING SERIES

Fundamentals
Flat Position
Horizontal Position
Flat and Horizontal Butt and Fillet
Vertical Position
Overhead Position

Continuing Education Publications Division, Oregon State Department of Education, Portland, Oreg.
....$288.00/Set
....$52.00 Each

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INTRODUCTION

Introduction to Electric Welding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-734714)

Colour/Sound Filmstrip (55 Frames). Time: 15 mins.

This filmstrip presents a brief history of the development of the stick, M.I.G., and T.I.G. electric welding processes. It explains the basic differences between oxy-acetylene and electric arc welding. It also explains the differences in stick, M.I.G., and T.I.G. Other processes such as electronic spot welding and plasma welding are discussed. Various types of equipment are illustrated and explained. This includes the motor generator, engine driven generator, rectifier, AC/DC arc welder combinations, and equipment for M.I.G. and T.I.G. welding.

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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LEARNING ARC WELDING SKILLS SERIES

Process Equipment and Safety
Flat Position Welding
Vertical, Overhead and Horizontal Position Welding
Welding Cast Iron with the Arc Welder
Hardsurfacing Farm Equipment
Heating, Brazing, Soldering and Cutting

Lincoln Electric Co. of Canada Ltd., Toronto, Ont.
....$14.60/Set

Colour and Black and White Filmstrips.

The first three filmstrips are in colour and introduce the arc welding processes, equipment, and safety. They present the basic arc welding skills for all position welding. The next filmstrips are in black and white and present detailed descriptions of the special welding techniques.

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MANUAL

Marine Audio Visual Instructional Systems Ltd., London, England.
(Electrolab Ltd., Belleville, Ont.)
....$465.00/Set
....$125.00 Each

/6mm Filmstrip/Tape in a Commpak® cartridge designed for use in La Belle projectors.

1. *Manual Electric Arc Welding Part I: Introduction and Safety* (T.17)

   The basic welding theory AC/DC is covered.

2. *Manual Electric Arc Welding Part II: Basic Techniques* (T.18)

   This programme covers the first steps in electric welding in the flat, vertical and overhead positions.

3. *Manual Electric Arc Welding Part III* (T.19)

   The steps are continued from Part I and the user is taken to an advanced level of welding practice.

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PRINCIPLES

Arc Welding Methods

Miller Electric Manufacturing Co., Appleton, Wisc. (Canadian Liquid Air, Bramalea, Ont.)

(003315) Super 8mm - Purchase	$225.00
(003314) 16mm - Purchase	$225.00
Rental	$25/wk.

Colour/Sound Motion Picture. Time: 28 mins.

This motion picture provides a comprehensive introduction to the arc welding methods most widely used. It provides a review of the methods, benefits, and equipment of electric arc welding. The major processes presented in this film are: shielded metal-arc (stick), gas tungsten-arc (T.I.G.), resistance spot, gas metal-arc (M.I.G.), submerged arc, and air carbon-arc gouging. Slow motion sequences show metal deposition in detail.

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SAFETY AND SETUP

Electric Welding Safety and Setup

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-734716)

Colour/Sound Filmstrip (55 Frames). Time: 16 mins.

This filmstrip explains: the required amperage-voltage, base metal combinations, selection of polarity, choice of type of electric arc for specific applications, and the safety factors pertaining to the basic processes.

One colour/sound filmstrip with double-sided phonodisc	$28.0
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3/4" per second)	$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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VOCABULARY

Electric Arc Welding Vocabulary

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-736202)

Colour/Sound Filmstrip (36 Frames). Time: 8:07 mins.

The names and illustrations for items pertaining primarily to electric arc welding are given. The student is referred to the *Oxy-acetylene Welding Vocabulary* filmstrip for other details.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3/4" per second)	$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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WELDING AND METALWORK SERIES

Arc Welding - Process, Equipment and Safety (450-64) (45 Frames)

Arc Welding - Flat Position Welding (451-64) (63 Frames)
Arc Welding - Vertical, Horizontal and Overhead Welding (452-64) (34 Frames)
Care and Maintenance of Arc Welding Equipment (470) (56 Frames)

Vocational Agriculture Service, College of Agriculture,
University of Illinois at Urbana-Champaign, Urbana, Ill.

First 3 Slidefilms	$11.00
(470)	$5.05

35mm Single-frame Size Slidefilms

These slidefilms can be used with a standard filmstrip projector. Some text material is shown on each frame.

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V

ARC WELDING
PACKAGED COURSES

SOUDAGE À L'ARC
COURS

BASIC AND ADVANCED

Westinghouse Electric Corp., Sykesville, Md. (Liquid Carbonic Ltd., Montreal, P.Q.)

(180066) Purchase of Standard Format	$425.00
(180074) Purchase of Standard Format	$280.00
(180066) Purchase of Special Format for Optisonic Viewers	$775.00
(180074) Purchase of Special Format for Optisonic Viewers	$525.00
(180066) Purchase of Special Format for Audiscan Viewers	$675.00
(180074) Purchase of Special Format for Audiscan Viewers	$425.00
(180066) Rental	$145.00
(180074) Rental	$95.00
(180066) Preview	$45.00
(180074) Preview	$35.00
(180066) Student Workbooks (Set of 3 including pre- and post-tests)	$11.25
(180074) Student Workbook (including pre- and post-tests)	$3.50
(180066 & 180074) Instructor's Guide	$10.00
(180066 & 180074) Audio-Scriptbook	$10.00

Standard Format: 35mm Colour Filmstrip, Standard Audiotape Deck (for use with Singer/Graflex and Dukane cassette type viewers). Audio visual equipment not included.

Special Format: Suitable for Optisonic Viewers (not included). 35mm Filmstrips and Tapes in Single Cartridge and Audiscan Viewers (not included). 16mm Filmstrips and Tapes in Single Cartridge.

Complete Course: Selected Audio Visual Format/1 Set of Student Workbooks/Instruction Guides/Audio-Scriptbook/Pre- and post-tests.

A six-step learning system is provided to assure individualized instruction for every student/trainee. These steps are (1) pre-tests; (2) basic safety rules instruction; (3) terminology and theory through programmed instruction books; (4) welding techniques through synchronized audio visual commpak cartridge instruction; (5) hands-on practice; and (6) post-tests. This course is suitable for students with seventh to eighth grade education and is self-paced. The instructors may also use the cartridge programs as the basis for their group lessons.

1. *Basic Arc Welding (Stick Electrode Welding)* (180066)

   Students complete this program in about 100 hrs. After an opening lecture on welding equipment, the trainees receive a complete safety checklist that includes clothing, protection for the eyes and body as well as fire-prevention techniques and how to eliminate hazards in the work area. From there, they go on to the general instruction in the 12 lessons.

Lessons:

1. Striking an Arc
2. Running a Bead
3. Stopping and Restarting a Bead
4. Running a Bead with a 5/32" Electrode
5. Bead/Test Weaving
6. Learning to Weld: Square butt joints, tilted T-joints, lap joints; horizontal T-joints; horizontal lap joints; horizontal V-groove butt joints, and cutting, burning and grinding.

2. *Advanced Arc Welding* (180074)

Students complete this program in about 220 to 250 hrs. The Student Workbook covers vertical, overhead, and pipe welds; welding problems; testing and inspecting welds; and welding symbols. Eight filmstrip lessons demonstrate the corresponding welding techniques. The course concentrates on the more sophisticated welding itself since the student has the basics of safety, equipment, and techniques. Emphasis is placed on practical "hands-on" training. At the end of each unit, the student will be able to perform each of the eight welds listed listed below.

Lessons:

1. Learning to Weld: Vertical Lap Joint
2. Vertical T-Joint (Stringer Beads)
3. Vertical T-Joint (Coverpasses and Weaves)
4. Vertical V-Grooved Butt Joint
5. Overhead T-Joint
6. Over V-Groove Butt Joint
7. Horizontal Pipe
8. All-Position Pipe

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CAREERS IN WELDING SERIES

Fundamentals of Arc Welding

Ken Cook Education Systems, Butler, Wis. (Electrolab Inc., Belleville, Ont.)

(1243) Complete Course	$1 .00
(1247) SR 100 Student Workstation	$1200.00
(1234) SR 100 Student Console	$825.00
Individual Programs	
(2805) Instructor's Manual	$8.95
(1262) Class Schedules	$1.50

(2765) Student Manual	$2.50
(1195) Student Certificates (25)	$3.75

Complete Course: 12 Programs/1 Instructor's Manual/10 Class Schedules/50 Student Manuals/50 Student Certificates

Programs:

1. *Introduction to Welding*

   Students are introduced to the field of welding and the vital role it plays in industry. The program continues with an explanation of different types of welding, weld identifications and related problems. Included are student response situations, presented by the Mark 9 Learning Sytem System, to stimulate the student's interest and participation. A workbook, provided with the course, is introduced to reinforce the students learning process.

2. *How to Use the Miller Arc Welder*

   This course utilizes a Miller Electric Thunderbolt Welder. The program introduces the student to the welder with detailed illustrated instructions for set up, operation and safety procedures. Related equipment, wearing apparel and out-of-position welding is discussed along with student workbook exercises.

3. *The Welding Arc*

   During this program, the fundamentals of the welding arc are explained and the students make their first weld. Prior to the actual welding task, the student is lectured on the correct set up, safety precautions and procedures. Chipping and proper cleaning of the weld is introduced along with other forms of welding tasks.

4. *Fundamental Welding Tasks*

   This program begins with a review of the preceding programs and the student repeats the initial welding tasks. Information on welding heat and penetration is presented with other related theory. Butt welding is introduced and the students perform a series of tasks as they practice proper arc length and travel speeds.

5. *Welding Joints*

   The students review their previous tasks as related to correct weld amperage. Further assignments of butt welding are given making way for an introduction to the lap fillet weld and proper electrode angles. The program continues with T-fillet welds, tacking techniques and the hazard of burn-thru due to excessive heat. Student response questions are presented for continued student learning reinforcement.

fillet welds, tacking techniques and the hazard of burnthru due to excessive heat. Student response questions are presented for continued student learning reinforcement.

6. *Electrode Classification*

In this program, the student is shown how the standard electrode numbering system is used and how electrodes are identified and classified. Tensile strength is explained as is its relationship with the electrode number. The five major electrode types used in this program and in program 7 are thoroughly discussed. Low hydrogen electrode humidity problems and iron powder electrode "drag weld" characteristics are covered, as are special alloy electrodes.

7. *Electrode Experiments*

The five particular electrode types to be used are reviewed by characteristics and the task of running five different weld beads is presented. After the task is completed, the various welds are evaluated and compared. A second task is then presented involving the use of only two electrode types, but three different sizes of each. The student then completes an individual welding task for the other three electrode types. Program continues with clean-up and student response situations.

8. *Welding and Electricity*

This program deals with the electronics and mechanics of the Thunderbolt Welder. A full explanation and discussion of the welder covers the basic AC step-down transformer, the the movable shunt, lines of flux, induced voltage and vol voltage-amperage ratios. The cooling devices in the machine are covered and after a workbook review involving welder c component identification, DC welders are explained. Following a student response review session, the student is brief-briefly introduced to M.I.G. and T.I.G. welding procedures and their differences from stick electrode welding.

9. *Horizontal Welding*

The student is introduced to the horizontal welding position and the use and adjustment of the out-of-position device in the welding booth. Safety instructions are again reviewed and the correct electrode angles for horizontal weld beads and butt welds are covered. The students are shown how to brace themselves in the booth to steady the electrode and they complete their first horizontal welding task. Weld layering and build-up is thoroughly discussed and V-grooving is explained. The student them completes horizontal fillet welds, both lap and T-fillet, after receiving the proper instructions on technique. Both E6011 and E6013 type electrodes are used.

10. *Vertical Welding*

Vertical welding is introduced and the difference between uphand and downhand vertical welding is explained. Electrode angles are related to flat position and then shown in vertical position. Explanations and cautions are given on arc length and travel speeds followed by a vertical stringer bead task presentation. Upon task completion and evaluation, the student is introduced to the whipping technique used in uphand welding and the proper electrode angles for vertical fillet welds. A student response review picks up several ideas and points to clarify any student questions. Closed and open corner welds are then introduced with an accompanying task involving the techniques learned.

11. *Overhead Welding*

This program starts with an introduction to overhead welding and stresses the importance of safety and protective clothing. Electrode angles, arc lengths and travel speeds for overhead weld beads are covered. Upon completion of the first overhead task and evaluation, the student is reacquainted with the E7018 low hydrogen electrode and completes a butt welding task in the overhead position. An E6011 electrode is then used to complete an overhead lap fillet weld followed by a short student response question series.

12. *Working with Metals*

This final program presents many areas related to the field of welding to broaden the student's overall knowledge. Presented is an illustrated lecture on the steel making industry from mining the ore through various types of finished steel production. The student is acquainted with the types of weld testing, metal strengths and given an explanation of welding symbols. Also presented are other related operations in industry to make the student aware of the various job possibilities. The program concludes with an overall summary with student response situations.

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FARM AND MAINTENANCE

The Lincoln Short Course Arc Welding Kit

Lincoln Electric Co. of Canada Ltd., Toronto, Ont.
(AV-129-A) Complete Course................................$4.85

Without Instructor's Manual	$3.35

30 WC-62 Certificates/20 SA-129 Forms (Receipt for Welder)/30 ED 28 Pocket Guide/30 Bulletin E320 (double page)

This outline provides a teaching guide for a condensed course in arc welding. It is a step-by-step method of teaching farm and maintenance welding in five lessons. The lessons are designed to give the average person enough knowledge and confidence in welding to be able to do the greater majority of his own welding. This course was designed to meet agricultural requirements in the fields of maintenance, repair and the construction of new equipment. The outline is also readily adaptable for teaching short courses in arc welding to persons working in sheet metal, plumbing, light road equipment, and body shop repair.

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GENERAL

Arc Welding, Course 39

Jackson, C.E. (Ed.), American Society for Metals, Metals Park, Ohio.

(3 CEU) Complete Course	$172.50
Individual Lessons	$6.00

This course is available in the form of a home-study course or an in-plant training course. All the lesson units are in a binder.

Home-Study Form: 15 Lessons/Lesson Tests/Final Exam/MEI Diploma

In-Plant Training Form: 15 Lessons/1 Instructor's Course Operation Guide/Complimentary Copy of Set of Lessons for Instructor if Class Contains Five or More Students/Lesson Tests/Final Exam/MEI Diploma

Lesson 1: Survey of Joining Processes

Descriptions of welding of plastics, adhesive bonding, soldering, brazing, and major welding processes

Lesson 2: Arc Welding Consumables and Power Supplies

Functions of electrode coatings and fluxes; Welding electrodes, wires and rods; Shielding gases; Alternating and direct current power sources.

Lesson 3: Fundamentals of Arc Welding

Principles of operation; Effect of welding current; Arc blow; Metal transfer modes; Metallurgy of welded joint; Preheating

Lesson 4: Mechanical Properties

Hardness; Tensile strength; Impact strength; Fatigue strength; Bendability; Properties of weld metal

Lesson 5: Welding Design

Types of joints, including butt, lap, tee, corner and edge; Welding symbols; Notch; Effects and stress distribution; Details of good design

Lesson 6: Weld Metal Soundness

Types of cracking; Tests for cracking; Metallographic examination; Restraint tests; Factors affecting weld cracking

Lesson 7: Carbon Steels

Metallurgical effect of welding; Effect of carbon; Transition temperature behaviour; Practical uses of carbon steels

Lesson 8: Low and Medium Alloy Steels

Comparison to carbon steel; Effect of preheat; Effect of postheat; Welding technique related to isothermal diagram

Lesson 9: High Alloy Steels - Fundamentals

High chromium alloy steels; Phase diagrams; Grain growth; Chromium-nickel austenitic steels

Lesson 10: High Alloy Steels - Techniques

Martensitic, ferritic, austenitic stainless, high temperature steels; Precipitation hardening steels

Lesson 11: Copper and Its Alloys

Typical welding applications for copper, brass, bronze and other copper alloys

Lesson 12: Aluminum, Magnesium, Titanium and Nickel

Typical welding applications for aluminum, magnesium, titanium, nickel, and their respective alloys

Lesson 13: Inspection of Weldments

Duties of an inspector; Imperfections in weldments; Discontin-

Duties of an inspector; Imperfections in weldments; Discontinuities in weld metal; Inspection methods; Destructive testing of welds; Nondestructive inspection methods for welds

Lesson 14: Weldability

Importance of and factors affecting weldability; Direct and indirect weldability tests; Present status of weldability

Metals Handbook - Welding and Brazing; Reference Guide

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VI

OXYACETYLENE WELDING AND CUTTING
PRINT MATERIALS

COUPAGE ET SOUDAGE OXYACÉTYLÉNIQUES
MATÉRIEL IMPRIMÉ

Barème de soudage autogène oxyacétylénique

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1958, 32 pp.

Brochure, format de poche, présentant sous forme de tableaux et schémas simples, les données essentielles relatives aux diverses méthodes opératoires de soudage oxyacétylénique et les éléments utiles pour l'établissement des prix de revient des assemblages obtenus.

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Basic Oxy-acetylene Welding

Griffin, I.H., Roden, E.M., & Briggs, C.W. Albany, N.Y.: Delmar Publishers, 1977, 100 pp. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)

(1252-0)	$4.00
(1253-9) Instructor's Guide	$ .50

This revised text-workbook emphasizes learning by the hands-on application. The material follows a logical, step-by-step procedure with safety information where necessary. Photographs have replaced line drawings for easy, quick comprehension of the written material. There are unit-end reviews to improve student understanding of technical information. Answers to all the review questions are in the accompanying Instructor's Guide.

Contents:

The oxy-acetylene welding process; Oxygen and acetylene cylinders; Welding gases; Oxygen and acetylene regulators; Types and uses of welding torches; Welding tips; The oxy-acetylene welding flame; Setting up equipment and lighting the torch; Flame cutting; Straight line cutting; Bevel cutting; Piercing and hole cutting; Welding symbols; Running beads and observing effects; Making beads with welding rod; Tacking light steel plate and making butt welds; Outside corner welds; Lap welds in light steel; Tee or fillet welds on light steel plate; Beads or welds on heavy steel plate; Manipulation of welding rod on heavy steel plate; Butt welds on heavy steel plate; Lap welds on heavy steel plate; Fillet or tee joints in heavy steel plates; Beveled butt weld in heavy steel plate; Backhand welding on heavy steel plate; Backhand welding of beveled butt joints; Brazing with bronze rod; Running beads with bronze rod; Square butt brazing on light steel plate; Brazed lap joints; Brazed tee or fillet joints; Brazing beveled butt joints on heavy steel plate; Building-up cast iron; Brazing beveled joints on cast iron; Silver soldering nonferrous metals; Silver soldering ferrous and nonferrous metals; Application chart basic oxy-acetylene welding; Comparison guide of cutting tip sizes; and Relation of cutting tip size to plate thickness.

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Brazing

Roberts, P.M. Don Mills, Ont.: Oxford University Press Canada, 1975, 32 pp.
.... $5.00

The common brazing processes are described and examples are given of their applications. The factors to be considered when designing a brazed joint are discussed and the materials available for many industrial brazing problems are listed. Helpful hints are included on the fitting together of parts which are not self-positioning.

*   *   *   *

Brazing Alloys and Fluxes

Handy and Harman of Canada Ltd. Toronto, Ont.: Author, 8 pp.
(C-202A)

The purpose of this catalogue is to provide information and assistance to companies that use brazing in the manufacture of their products but it also contains suggestions on when to consider brazing, how to select brazing materials, and how to effect substantial economies in the brazing process.

*   *   *   *

Brazing Manual

American Welding Society. Miami, Fla.: Author, 1976, 309 pp.
(Canadian Welding Society, Weston, Ont.)
(BRM)...$19.80

This book covers the fundamental concepts of brazing and incorporates many recent advances in the process. In addition to the basics of brazing, the book also discusses fluxes, brazing of a variety of metals, alloys and other materials, and specific applications. The properties of brazeable metals and alloys are given.

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Coupage thermique des aciers - exemples d'applications au cas des fontes

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18:
Auteur, février 1975, 38 pp.

Cette brochure fait le point des origines de la fissuration lors du coupage thermique et des solutions proposées pour l'éviter. Des recommandations pratiques concernant l'oxycoupage des aciers moulés accompagnées d'exemples d'applications au cas des fontes suivent l'étude bibliographique.

* * * *

Fabrication of Oxy-acetylene Welded Steel and Wrought Iron Piping

Union Carbide of Canada Ltd. Toronto, Ont.: Author, 1976, 64 pp.
(639119)...$1.25

This is a basic text on oxy-acetylene pipe welding beginning with a review of fusion welding fundamentals as applied to the fabrication of pipe. A section on procedure control for installing steel and wrought iron piping systems follows. This includes information on the qualification of welding operators; selection of pipe materials, welding rods, gases, and welding and cutting apparatus; preparation for welding; and the inspection and testing of welded joints and fittings. A major portion of the book is devoted to the layout methods used in fabricating the various parts of a piping system. These are described in considerable detail in the text and in numerous illustrations. Instructions are given for establishing longitudinal and circumferential reference lines on pipe. A number of techniques for changes in pipe direction are shown: angled joints; two-piece welded turns; multipiece welded turns; use of piping elbows; and wrinkle-bending of pipe and its advantages. Branch, laterial, and "Y" connections are discussed, as are flanges, pipe reducers, and heads.

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Flame Cutting - Acetylene, Propane, Natural Gas, MAPP® Gas, Propylene, Etc.

Harris Calorific Division, Emerson Electric Co. Cleveland, Ohio:
Author. (Canadian Oxygen Ltd., Toronto, Ont.)
....Free

The brochure describes the flame cutting process. Modern fuel gases--acetylene, natural gas, propane, MAPP , propylene--their features, and their significance in the flame cutting process are discussed.

Contents:

The function of the preheat flame; The role of oxygen in the cutting process; How fuel gas properties, burning velocity, rate of gas flow, explosion limits, specific gravity, flame temperature, and combustion ratio affect flame conditions; Cutting speed; and the Cost of cutting operations.

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La formation du joint brasé

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1977, 133 pp.

Cet ouvrage traite principalement de l'analyse des processus physico-chimiques intervenant dans la constitution d'un joint brasé. En particulier sont examinées les intéractions entre le métal d'apport et le métal de base aux divers stades de formation de l'assemblage.

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Gas Welding

Giachino, J.W. Chicago, Ill.: American Technical Society, 1977, 92 pp. (General Publishing Co. Ltd., Don Mills, Ont.) $3.96

The welding operations that are used particularly in general maintenance or repair work are dealt with in this text. It was intended primarily for those who are preparing to work in industry, auto shops, building trades, repair shops, and other construction fields where gas welding is used. The book consists of twelve units and each unit contains three parts. First there is a description of the basic principles and practices used in gas welding. Following this is a self-quiz which includes test items designed to show the students how well they understand the welding principles and practices involved. Finally, there is a welding assignment which is intended to give students an opportunity to acquire the skills in actual gas welding.

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Gas Welding Manual

Jefferson, T.B. Lake Zurich, Ill.: Monticello Books, 1961, 136 pp. Paperback.
....$2.50

This "how-to" compact book with the "Jiffy Welding Guides" provides suggestions on welding many kinds of metals using terms familiar to those who can weld steel. It is suitable for those who don't know how to gas weld and wish to learn. Flame cutting is included, along with general suggestions on maintenance and production welding procedures.

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High Temperature Brazing

Pattee, H.E. New York, N.Y.: Welding Research Council, Sept. 1973.
(187)..$5.00

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Introduction to Oxy-acetylene Equipment (W2001)
Safety - Oxy-acetylene Welding and Cutting (W2001-1)
Assembly: Turning On and Turning Off Oxy-acetylene equipment (W2002)
Turning On and Turning Off the Manifold Regulators (W2003)
Lighting the Torch and Adjusting the Flames (W2004)
Oxygene and Acetylene Cylinders (W2005)
Oxygen and Acetylene Regulators (W2006)
Oxy-acetylene Welding Torches and Tips (W2007)
Manual and Semi-Automatic Cutting Machines (W2008)
Cutting with a Straight Line Cutting Machine (W2009)
Manual Flame-Cutting Torches (W2010)
Cutting Circles with the Manual Torch (W2011)
Cutting Bevels with the Manual Torch (W2012)
Piercing Holes with a Manual Torch (W2013)
Cutting Round Stock with the Manual Torch (W2014)
Terms and Definitions - Oxy-acetylene (W2015)
Puddling without Rod (Beads without Filler Rod) (W2101-1)
Beads Using Welding Rod (W2101-2)
Fillet Weld - Horizontal Position (W2102)
Flange Weld - Flat Position (W2103)
Butt Weld - Flat Position (W2104)
Lap Joint Fillet Weld - Flat Position (W2105)
Welding a Corner Weld without Welding Rod (W2106)
Bronze Welding Cast Iron (W2135)
Oxy-acetylene Welding Cast Iron (W2136)
Silver Brazing (W2137)

Soft Soldering (W2138)
Aluminum Welding with the Oxy-acetylene Process (W2140)
Stainless Steel Welding (W2141)
Welding White Metal (W2142)
Welding Magnesium (W2143)
Beads Using Filler Rod - Horizontal Position (W2201)
Butt Joint - Horizontal Position (W2204)
Lap Joint Fillet Weld - Horizontal Position (W2205)
Beads with Filler Rod - Overhead Position (W2301)
Fillet Weld - T Joint - Overhead Position (W2302)
Butt Joint - Overhead Position (W2304)
Bead with Welding Rod - Vertical Position (W2401)
Fillet Weld - Vertical Position (W2402)
Butt Weld - Vertical Position (W2404)
Lap Joint - Vertical Position (W2405)

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author.
....$ .38 Each

These learning modules designed for student use, each contain a purpose, objectives, learning opportunities, an information summary, a self-test, and a post-test.

* * * *

The Oxy-acetylene Handbook

Union Carbide of Canada Ltd. Toronto, Ont.: Author, 1976, 300 pp.
(781F00) (4430) Softcover....................................$8.40
(3953) Hardcover....................................$10.80

This new revised edition has been checked and updated by experts in techniques, equipment, metallurgy and safety. Useful and instructive information is given on every oxy-acetylene process and its application. Metallurgical information includes tests for identifying metals, expansion and contraction and how to deal with them, metal properties important to welding, and many more. The techniques for joining, cutting, and treating each metal are specifically described. Descriptions of the various types of apparatus and their operating characteristics are fully described and illustrated. This handbook is ideal for the beginner and advanced student.

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Oxy-acetylene Welding: Basic Fundamentals

Baird, R.J. South Holland, Ill.: Goodheart-Willcox, 1976, 112 pp. Softcover. (General Publishing Co. Ltd., Don Mills, Ont.)
....$4.50

This beginning text gives the basic fundamentals in an easy to understand manner. It is profusely illustrated with many photographs and drawings including extra colour.

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Oxy-acetylene Welding and Cutting

Vocational Agriculture Service, College of Agriculture, University of Illinois at Urbana-Champaign. Urbana, Ill.: Author, 28 pp.
(3001a)..$ .60

This printed pamphlet is intended for student text and reference use. It measures 8-1/2" x 11" in size and is punched for a three-ring notebook.

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Oxy-acetylene Welding and Cutting

Airco Welding Products. Union, N.J.: Author, 205 pp.
(8203-8003)..$3.00

This bound book contains lectures and exercises on oxy-acetylene welding, cutting and braze welding.

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Oxy-acetylene Welding, Brazing, and Cutting for the Beginner

Union Carbide of Canada Ltd. Toronto, Ont.: Author, 1973, 56 pp. Softcover.
(791F20)...$2.40

This is a beginning handbook for someone who has no previous knowledge of these processes or the equipment used in them. More than 160 step-by-step sketches and photographs in conjunction with a clearly-written, self-teaching text are given. The actual oxy-acetylene apparatus as well as the supplies, accessories and protective clothing required for practice sessions are given. The book explains the safe set-up of these items; how to connect the oxygen and acetylene regulators to the gas cylinders, and the torch to the regulators; how to adjust gas pressures and how to test the equipment for leaks; how to light the torch and properly adjust the flame. The actual techniques of welding and cutting are described in detail, with each movement of the torch spelled out in words and sketches, making it easy to follow. This is useful for learning how to cut a straight line, circle or bevel, and making a simple joint or a more complicated position weld. The welding of metals other than steel is discussed as is the use of the oxy-acetylene flame for forming, bending, straightening, and other heating applications. Illustrations and instructions for projects are given at the back of the book.

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The Oxy-acetylene Weldor's Handbook

Jefferson, T.B. Lake Zurich, Ill.: Monticello Books, 310 pp.
7th Edition.
....$4.00

Written for the beginner, this pocket-sized volume traces the steps involved in learning gas welding--from setting-up the welding outfit to flame cutting, pipe welding, maintenance and hobby welding, and concludes with the chapter on art (sculpture) welding. Safe practice in welding is emphasized, and the book also features important information on oxy-propane cutting.

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Oxy-Fuel Operational Guide

Victor Equipment Co. of Canada Ltd. Oakville, Ont.: Author.
Single Copies..Free
Over 10 Copies.....................................$ .50 Each

This new colour-coded pocket-sized operational guide provides the complete operational and performance data for all welding, cutting, and multi-flame heating tips including Victor's new GP, HP, and MTH tip series.

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Oxy-Fuel Power ADC 1169

Airco Welding Products. Union, N.J.: Author,
(8242-0153)...$3.50

This cost includes two books on the use of oxy-fuel welding and the cutting processes with related equipment and supplies. A supplementary material section of a general products catalogue is also used in conjunction with the above.

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La pratique du soudage oxyacétylénique et des techniques connexes

Leroy, A., Evrard, M., et d'Herbemont, G. 75880 Paris, CEDEX 18: Publications de la Soudure Autogène, 344 pp.

Généralités. Matières premières. Matériel de soudage oxyacétylénique. Méthodes de soudage. Dilatation et retrait, montages de soudage. Qualités et défauts des soudures. Contrôle du soudage et essais des soudures. Soudage des divers métaux et alliages. Oxycoupage et techniques connexes. Soudobrasage. Rechargements et applications diverses de la flamme.

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Précis de soudage - brasage et techniques connexes - coupage - métallisation - rechargement

Le Gouic, R. 75240 Paris, CEDEX 05: Eyrolles, 1976, 160 pp.

Contenu:

Définitions élémentaires; Types d'énergie et classification des procédés; Métallurgie et soudabilité; Propriétés mécaniques des métaux; Structure cristalline; Résistance à la corrosion; Métaux ferreux (diagramme Fe-C. Aciers non alliés; Traitements thermiques; Influence des impuretés de l'hydrogène et des éléments d'addition et d'alliage; Aciers faiblement et fortement alliés; Inoxydables; Fontes); Métaux non ferreux (influence du chauffage et du refroidissement; Durcissement par précipitation); Examens métallographiques (macrographie, micrographie); Procédés d'assemblage; Tous les procédés sont passés en revue; Mise en oeuvre des matériaux et des procédés; Préparation des assemblages; Exécution des assemblages; Traitement des assemblages; Contrôle des assemblages; Défauts des joints; Les différentes méthodes de contrôle; Contrôle radiographique aux ultrasons; Autres méthodes (contrôle magnétique et par ressuage, épreuves sous pression); Techniques connexes; Coupage thermique; Projection à chaud; Rechargement et chemisage; Trempe superficielle au chalumeau; Soudage et coupage sous l'eau.

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Setting Up Oxygen-Acetylene Equipment (602-A)
Oxygen-Acetylene Welding Tips (602-B)
Lighting and Shutting Off the Torch (602-C)
Types of Oxy-acetylene Flames (602-D)
Puddling without Rod (602-E)
Puddling with Rod (602-F)

Flat Butt Weld with Rod (602-G)
Welding Corner Joints (with and without a Rod) (602-H)
Welding Lap Joints (602-I)
Welding a "T" Joint (602-J)
Flat Butt Veed Weld with Multiple Passes (602-K)
Bronze Welding (602-L)
Oxygen-Acetylene Cutting (602-M)
Forehand Versus Backhand Welding (602-N)

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author.
....$ .38 Each

The above are learning modules.
for

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Le soudage

Pender, J.A. Montréal (Québec): McGraw-Hill, Editeurs, 1977, 212 pp. 2e édition.
(82666-8)..$8.50

Cette deuxième édition répond à une nouvelle réalité dans l'industrie: l'implantation du système international d'unités. Cette conversion au SI porte sur les opération, les matériaux, les outils ainsi que sur les normes de fabrication. Le but de ce manuel est d'aider le débutant à se familiariser avec les différents procédés de soudage et à en acquérir une connaissance pratique. Ainsi, des exercices manuels sont proposés chaque fois qu'une nouvelle technique est exposée. De nouvelles notions sur les procédés de soudage ont été ajoutées pour mieux couvrir les nombreaux programmes des écoles. Ce supplément sera utile au professeur qui désire prolonger son enseignement au-delà des rudiments du soudage. Ce volume présente donc, en plus d'une application du système international d'unités aux techniques de soudage, un excellent contenu théorique.

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Soudage

Gerbeaux, H. 75880 Paris, CEDEX 18: Publications de la Soudure Autogène, 134 pp.

Contenu:

Terminologie; Différents procédés de soudage; Mise en oeuvre des principaux procédés de soudage par fusion, par résistance électrique opérant avec pression. Défauts de soudures; Contrôles non destructifs des soudures; Contrôles semi-destructifs; Contrôles destructifs; Procédés connexes au soudage; Brasage; Soudo-brasage; Rechargement par soudage; Projection à chaud (ou métallisation); Coupage thermique; Trempe superficielle à la flamme; et Décapage à la flamme.

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La soudure autogène au chalumeau et à l'arc

Meslier, R. 75240 Paris, CEDEX 05: Eyrolles.

Contenu:

La soudure et les procédés de soudage; Notions générales; La soudure oxyacétylénique; Générateurs d'acétylène; Chalumeaux soudeurs; Détendeurs d'oxygène et d'acétylène; Accessoires des postes de soudage; Utilisation des postes; Métaux et produits d'apport; Règles générales d'exécution des soudures; Méthodes opératoires d'exécution des soudures sur acier; Soudage des métaux et alliages divers; Rechargements oxyacétylique; Soudo-brasure; Oxy-coupage; La soudure à l'arc électrique; Outils et accessoires du soudeur à l'arc; Electrodes de soudure à l'arc; et Exécution des soudures.

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Specification for Brazing Filler Metal

American Welding Society. Miami, Fla.: Author, 1976, 36 pp.
(Canadian Welding Society, Weston, Ont.)
(A5.8-76)..$5.50

This book includes the chemical, mechanical, and packaging requirements (U.S.) plus a useful guide to the filler metals classified.

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Standard Method for Evaluating the Strength of Brazed Joints

American Welding Society. Miami, Fla.: Author, 1963, 7 pp.
(C3.2-63)..$2.20

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Welding Craft Practice - Part I, Volume I: Oxy-acetylene Gas Welding and Related Studies

Parkin, N., & Flood, C.R. Toronto, Ont.: Pergamon Press, 1969, 159 pp.

This straightforward, simple and practical book was designed to provide all the basic knowledge required for the welding trade. It is broken down into convenient and progressive components. Emphasis has been placed on safety training where appropriate.

Contents:

Oxy-acetylene gas welding; Basic welds and technique; Oxygen cutting of steels; Inspection and testing of welds; Related studies; Appendix 1: glossary of welding and general terms and abbreviations; and Appendix 2: revision questions.

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Welding, Cutting and Heating Guide

Victor Equipment Co. of Canada Ltd. Oakville, Ont.: Author.

Single Copies	Free
Over 10 Copies	$ .50 Each

The cutting technique and procedure data presented in Victor's film *The Fundamentals of Oxy-Fuel Cutting* is included in this issue. It is a complete "how-to" package for all oxy-fuel welding, cutting, and multi-flame heating operations. Safe operating procedures are emphasized throughout.

Contents:

General safety information; Industrial gases; Oxy-fuel apparatus: description and function; Setting up the equipment (for welding); Welding procedures; Setting up the equipment (for cutting); and Oxy-fuel cutting operations.

* * * *

Welding Procedures: Oxy-acetylene

Schell, F.R. Albany, N.Y.: Delmar Publishers, 1977, 130 pp.
(Van Nostrand Reinhold Ltd., Scarborough, Ont.)

(1600-3)..	$3.80
(1601-1)..	$1.25

In this text-workbook, students learn the "how-to" of oxy-acetylene welding. The self-instructional format provides behavioural objectives, hands-on procedures, related technical information and unit-end reviews. All material in this highly illustrated text has been classroom tested. It features sectional subtopics, job destructive tests, and a glossary. Covered in this text are flat, vertical, horizontal and overhead welding, brazing, backhand welding, cutting, and welding steel plate and pipe. The answers to the review questions are in the Instructor's Guide.

Contents:

Welds in the flat position: Setting up oxy-acetylene welding equipment; Lighting the oxy-acetylene torch; Running a bead with filler rod, flat position; Butt weld on mild steel sheet metal, flat position; Fillet weld on mild steel sheet metal, flat position; Lap weld on mild steel sheet metal, flat position; 60-degree fillet weld on mild steel sheet metal, flat position; Comprehensive review; Welds in horizontal and vertical positions: Bead on mild steel sheet metal, horizontal position; Butt weld on mild steel sheet metal, horizontal position; Bead on mild steel sheet metal, vertical position; Butt weld on mild steel sheet metal, vertical position; Lap weld on mild steel sheet metal, vertical position; T-weld on mild steel sheet metal, vertical position; Comprehensive review; Overhead welds, braze welding, and backhand welding: Bead on mild steel sheet metal, overhead position; Butt weld on mild steel sheet metal, overhead position; Lap weld on mild steel sheet metal, overhead position; Corner welds on mild steel sheet metal; Braze welding sheet metal; Braze welded butt joint on mild steel sheet metal; Braze welding cast iron; Backhand welding on mild steel sheet metal; Backhand butt weld on mild steel sheet metal; Comprehensive review; Oxy-acetylene cutting; Straight cutting with the oxy-acetylene cutting torch; Beveling plate with the oxy-acetylene cutting torch; Cutting holes with the oxy-acetylene cutting torch; Comprehensive Review; Welding steel plate and pipe: Welding mild steel plate; Butt welding pipe in the vertical fixed position; Butt welding pipe in the horizontal fixed position; Comprehensive review; Glossary.

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VII

OXYACETYLENE WELDING AND CUTTING
NON-PRINT MATERIALS

COUPAGE ET SOUDAGE OXYACÉTYLÉNIQUES
MATÉRIEL NON IMPRIMÉ

AIRCRAFT WELDING

Aircraft Welding: Oxy-acetylene

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (67 Frames). Time: 14 mins. 1974

This filmstrip identifies and explains the welding problems specific to the manufacture and maintenance of the light and medium aircraft.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

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BASIC PRINCIPLES

Introduction to Oxy-acetylene Welding

Mafex Associates, Ltd., Johnstown, Penn. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (54 Frames). Time: 13:28 mins.

This is a resumé of the development and scope of the oxy-acetylene flame, beginning with experiments by the French chemist, Le Chatelier, in 1895. Fusion welding, flame cutting, flame gouging, flame deseaming, profile cutting, as well as brazing and heating operations, are some of the processes delineated in the filmstrip. It is important for the student to understand the wide scope of application for the flame processes.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

BRAZING

Braze Welding

Audio Brandon Films, Mount Vernon, N.Y. (Marlin Motion Pictures, Ltd., Mississauga, Ont.)
....$180.00

16mm Film. Time: 13 mins. 1972.

Using demonstration and animation, this film shows both the basic techniques and the wide number of applications for these techniques.

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CAREER AWARENESS SET IV - PROFESSIONAL BEGINNERS SERIES: OXY-ACETYLENE WELDING

The Oxy-acetylene Welding Outfit (Set-up, Testing for Leaks, and Safety
Turning On, Lighting, and Shutting Down
Running Beads: All Types
Brazing and Silver Soldering

Paramount Communications, Hollywood, Calif. (Macmillan Co. of Canada, Toronto, Ont.)

(9545) 4 Filmstrips/4 Cassettes/Teacher's Guide/Study Guide	$78.00
Each Filmstrip	$15.00
As a Cassette	$7.50

16mm Filmstrip.

These filmstrips provide a clear, basic understanding of the welding equipment and safety precautions with unusually detailed views of the welding techniques. The Study Guide, affixed to the lid of each filmcan, gives objectives and synopses, indicates grade levels and subject areas, and suggests discussion questions and related classroom activities.

Recommended Levels: Grades 7 to 12.

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CUTTING - FUNDAMENTALS

The Fundamentals of Oxy-Fuel Cutting

Victor Equipment Co. of Canada Ltd., Oakville, Ont.

Purchase	$295.00
Loan	Free

16mm Colour/Sound Film. Time: 30 mins.

Close-up colour photography is used to illustrate the flame cutting process and to identify the proper procedures and techniques for achieving quality cuts.

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CUTTING

Cut-A-Way

Victor Equipment Co. of Canada Ltd., Oakville, Ont.
..........Free

7 Wall Charts.

This set of charts measuring 17" x 22" has colourful illustrations to identify apparatus component parts, the separation of gases and gas flow, and principal design features.

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CUTTING

Oxy-acetylene Cutting

Marshall Maintenance, Trenton, N.J. (Electrolab Ltd., Belleville, Ont.)

(5) Purchase	$225.00
Rental	$70/wk.

16mm Colour Film with Narrations. Available in Video-Cassette Format.

This film shows the method of setting up the oxy-acetylene outfit in a safe fashion, how to put it away, the proper safety practices and how to always make a clean cut with little practice.

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CUTTING

Surface Roughness Guide for Oxygen Cutting

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)

(GAUGE)..$5.50

Plastic Gauge

This plastic gauge measuring 2-1/4" x 6-3/8" gives four samples of varying degrees of roughness of oxygen-cut steel.

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CUTTING

Tips for Better Cutting

Victor Equipment Co. of Canada Ltd., Oakville, Ont.
....Free

Coloured Chart.

This chart measuring 38" x 24" provides colour photographs of good versus bad oxy-fuel cuts to aid the operator in identifying errors in technique, equipment settings, etc. It also includes tips on trouble-shooting and equipment maintenance.

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CUTTING TECHNIQUES

Oxy-acetylene Cutting Techniques

Mafex Associates, Inc., Johnstown, Penna. (Niagara Publishers, Fenwick, Ont.)
(LC72-734712)

Colour/Sound Filmstrip (50 Frames). Time: 12:01 mins.

The method of setting up the equipment for flame cutting and proceeding with the various tasks that may be used in industry are illustrated.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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CUTTING TORCH

The Cutting Torch: Flame Cutting

BFA Educational Media, Santa Monica, Calif. (Holt, Rinehart and Winston, Toronto, Ont.)
(10944) Purchase.......................................$240.00
Rental.......................................$15.00

16mm Colour Film. Time: 15 mins.

The film opens with the safety precautions demanded by flame cutting. The conversion of the welding torch for cutting, pressure setting, lighting, and making straight cuts are shown. The use of the torch includes cutting off heavy sections of round bar stock.

Recommended Levels: Senior High, College, and Adult Education.

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DESCRIBING OXYGEN-CUT SURFACES

Criteria for Describing Oxygen-Cut Surfaces

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)
(C4.1-77)...$1.65

Chart. 1977.

This chart measuring 11" x 25-1/2" illustrates and defines the terms needed to accurately describe an oxygen-cut surface.

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EQUIPMENT

How to Use the Oxy-acetylene Welder

RMI Educational Films, Inc., Kansas City, Mo.
(8114)..$25.00

Colour/Sound Filmstrip Available with Cassette or Record. 1970.

This is an introduction into the theory and process of using the oxy-acetylene welder. The filmstrip explains simply and clearly what is involved in making a good quality weld joint with the gas welder, and how to adjust and recognize the proper welding flame. A simple exercise is used to illustrate and teach the basic methods of handling the different kinds of welds: the butt joint, the lap, the fillet, and the vertical and cylindrical weld on light and heavier material.

Recommended Levels: Junior and Senior High School, and College Education.

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EQUIPMENT

Oxy-acetylene Equipment Set-Up Procedure

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(AT C-5A)..$18.00

Filmstrip/Audio Cassette/Worksheet/3 Job Sheets

This filmstrip gives instruction in the proper set-up procedure of the oxy-acetylene welding equipment with the emphasis on safety.

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EQUIPMENT

Oxy-acetylene Welding: Equipment

BFA Educational Media, Santa Monica, Calif. (Holt, Rinehart and Winston, Toronto, Ont.)
(10937) Purchase..$250.00
Rental...$15.00

16mm Colour Film. Time: 16 mins.

This film describes the equipment that is usually used in bench-type gas welding and brazing. The correct procedures for assembling the equipment, lighting the torch, and adjusting the flame are shown.

Recommended Levels: Junior and Senior High, College, and Adult Education.

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EQUIPMENT

Oxy-acetylene Welding: Setting Up the Equipment

Vocational Education Productions, California Polytechnic State University, San Luis Obispo, Calif.
(1-784-200)..$10.50

Colour/Silent Filmstrip (53 Frames)

Step-by-step procedures are presented in setting up and lighting the oxy-acetylene welding equipment. Each operational step is pictured and described, with photographs and diagrams combined to emphasize the key points. The necessary safety precautions are also explained.

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EQUIPMENT

Oxy-acetylene Welding Equipment

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(AT C-4A)..$18.00

Filmstrip/Audio Cassette/Worksheet

This filmstrip covers the equipment, supplies, and gases used in oxy-acetylene welding.

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FLAME CHARACTERISTICS

Flame Characteristics

Victor Equipment Co. of Canada Ltd., Oakville, Ont.
....Free

Chart.

This chart measuring 38" x 24" provides coloured photographs of the various types ofwelding and cutting flames, and tells how to correctly adjust the torch to achieve proper flame configurations. It also includes a complete package of operational and performance data.

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FLAME CUTTING TECHNIQUES

Flame Cutting

Audio Brandon Films, Mount Vernon, N.Y. (Marlin Motion Pictures, Ltd., Mississauga, Ont.)
....$165.00

16mm Film. Time: 11 mins. 1973.

Using demonstration and animation, this film illustrates the basic techniques and the wide number of applications for these techniques.

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FLAMES AND THE TORCH

Oxy-acetylene Welding: Flat Position Welds

Vocational Education Productions, California Polytechnic State University, San Luis Obispo, Calif.
(1-785-200)..$10.50

Colour/Silent Filmstrip (67 Frames).

These 67 frames of detailed close-up photography look at types of welding flames and the welding torch in action. This production follows up on the information presented in the filmstrip *Oxy-acetylene Welding: Setting Up the Equipment* and shows the proper methods of making simple flat position welds. Safety precautions are also emphasized.

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FUSION

Oxy-acetylene Fusion Welding

Mafex Associates, Ltd., Johnstown, Penna. (Niagara Publishers, Fenwick, Ont.)
(LC72-740150)

Colour/Sound Filmstrip (55 Frames). Time: 15:03 mins.

This filmstrip is primarily concerned with teaching the student to run a good bead. It defines and illustrates the properties of a functional weld. Also shown is the method of running a bead on a flat plate with a rod, making a corner weld, and welding a butt joint.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second) $30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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GENERAL

Oxy-acetylene Welding

Instructional Materials Laboratory, University of Missouri - Columbia, Columbia, Mo.
(AG12-T)...$15.90

53 Transparencies. 1974.

These transparencies were developed primarily for use in agriculture classes.

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HAND OPERATIONS - METALWORK SERIES

Brazing

Moreland-Latchford Productions Ltd., Toronto, Ont.
(International Tele-Film Enterprises Ltd., Toronto, Ont.)
(2-610D)...$20.00

Super 8mm Colour Film with Captions.

Recommended Levels: Intermediate, Senior, and Adult Education.

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MAPP GAS THEORY AND PRACTICE SERIES

Airco Welding Products, Union, N.J.
....$40.00 each
(VTS 1003) Self Instructional Manual included.

Black and White Video Tapes

These video-tapes explain the techniques and practices in oxy-fuel welding and cutting where MAPP Gas is the fuel gas. The self-instructional manual included with each purchase is used in conjunction with the tapes. It can be used by an individual as a one-on-one basis, or by an instructor in a classroom situation.

The manual contains lesson plans specifying the subject, objective, type of instruction, references, training materials, the presentation; and a conclusion.

(8242-0154) *Equipment Set-Up and Shut Down.* Time: 22 mins.
(8242-0155) *Light Up and Flame Adjustment.* Time: 23 mins.
(8242-0156) *Cutting, Beveling, and Piercing Techniques.* Time: 27:00 mins.
(8242-0157) *Special Tips and Underwater Cutting.* Time: 29:30 mins.

Contents:

Gouge washing; Rivet washing; Heating; and Bulk Heads.

(8242-0158) *Welding, Brazing, and Silver Soldering.* Time: 9:30 mins.

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OXY-ACETYLENE CUTTING EXPLAINED SERIES

Bergwall Productions, Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)
(903)..$46.00

2 Colour Filmstrips (81 Frames Each)/2 Cassettes/Study Guide. Time: 13 mins. each.

1. *Setting Up Equipment*

   A complete explanation is given of how the cutting operation works. The cutting, how to attach it to the torch body, and lighting and testing the flame are explained. The complete procedure for purging the line is shown, as well as how to shut the unit down.

2. *Specialized Oxy-acetylene Cutting*

   The torch angle and the correct cutting procedure are explained. The method of lighting and testing the flame, the procedures for cutting thin and heavy stock, chamfering, and how to construct and use a guide for cutting a circle are shown. Also explained is the method of cutting a circle, as well as how to pierce stock.

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OXY-ACETYLENE WELDING SERIES

Adjusting Gas Pressures with Torch Valves Closed, and Lighting Torch
Adjusting Gas Pressures with Torch Valves Open, and Lighting Torch
Flame Effects on Molten Pool
Lines of Fusion (Beads Without Rod)
Weld Beads Using Filler Rod
The Corner Joint
The Square Butt Joint
Fillet Welds
Edge and Flange Joints
Braze Welding Beads

Prentice-Hall of Canada Ltd., Scarborough, Ont.
....$280.00/Set
....$28.00 Each

Super 8mm Colour Filmloops.

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OXY-ACETYLENE WELDING SERIES

Vocational Agriculture Service, College of Agriculture,
University of Illinois, Urbana, Ill.
12 Slidefilms/6 Cassette Tapes/Special Storage Box.........$75.00
12 Slide Sets/6 Cassette Tapes/Shipping Box Only..........$120.00

This series of 12 slidefilms or slide sets may be purchased with or without a cassette for use with a class or for individualized study. Each is priced separately with or without a cassette. The slide sets are standard 2" x 2" colour slides.

	Slidefilm	Slide Set	Cassette
1. *Equipment and Processes* (61 Frames) (454A)	$5.30	$10.65	$3.50
2. *Equipment Safe Practices* (83 Frames) (455A)	6.90	15.45	3.50
3. *Equipment Setting Up* (57 Frames) (456A)	5.10	10.05	3.50
4. *Lighting and Adjusting the Flame* (42 Frames) (471)	4.35	7.80	3.50
5. *Manual and Machine Cutting* (70 Frames) (472)	5.75	12.00	3.50
6. *Bronze Welding* (63 Frames) (473)	5.40	10.95	3.50
7. *Fusion Welding Steel* (74 Frames) (474)	5.95	12.60	3.50
8. *Hard Facing* (50 Frames) (475)	4.75	9.00	3.50

	Slidefilm	Slide Set	Cassette
9. *Using Powder Braze Torch* (43 Frames) (476)	$4.40	$ 7.95	$3.50
10. *Aluminim Welding* (49 Frames) (477)	4.70	8.85	3.50
11. *Silver Brazing* (52 Frames) (478)	4.85	9.30	3.50
12. *Equipment Maintenance* (58 Frames) (479)	5.15	10.20	3.50

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OXY-ACETYLENE WELDING SERIES

Introduction to Oxy-acetylene Welding
Oxy-acetylene Welding Vocabulary
Oxy-acetylene Safety and Set-Up
Oxy-acetylene Cutting Techniques
Oxy-acetylene Fusion Welding
Brazing and Soldering

Thompson-Mitchell and Associates, Atlanta, Ga.
6 Filmstrips/Cassette Tape.................................$156.00
Each Filmstrip with Cassette Tape..........................$26.00

Colour/Sound Filmstrips.

Recommended Levels: Secondary, Vocational, College, and Adult Education.

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OXY-ACETYLENE WELDING SERIES

Safety
Flames
Edge Preparation and Joint Assembly-I
Edge Preparation and Joint Assembly-II

Thompson-Mitchell and Associates, Atlanta, Ga.
....$100.00/Set
....$25.00 each

35mm Colour Filmstrips/Cassettes

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OXY-ACETYLENE WELDING SERIES #845

Welding Dress and Safety (84501)

Installing the Regulators (84502)
Attaching the Torch (84503)
Turning On and Testing for Leaks (84503)
Lighting the Torch and Shutting Down the Outfit (84504)
Running Beads (84505)
Corner Welds (84506)
Setting Up the Cutting Attachment (84507)
Oxy-acetylene Cutting (84508)
Cutting a Hole (84509)
Brazing Flux (84510)
Brazing (84511)

National Scientific Products Ltd., Mississauga, Ont.
....$291.00/Set
....$24.25 Each

Technicolor Cartridges/Study Guides. Kodak on request - same price. prices.

Recommended Levels: Senior High and College Education.

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TECHNIQUES

Oxy-acetylene Welding

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
(301/C2)..$29.95

Regular 8mm/Super 8mm Silent Filmloops in Technicolor Cartridges.

This filmloop illustrates the correct working situation and the techniques relating to nozzle or jet size and flame conditions, and the completion of welds. Emphasis is placed on safe working.

Recommended Levels: Secondary, Industrial, and Further Education.

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TECHNIQUES

TOTE-WELD Outfit, Display and Operations

Airco Welding Products, Union, N.J.

(8242-0173)	Video-Tape....................................	$40.00
	Super 8 Reel..................................	$75.00
	Super 8 Cartridge for Technicolor Showcase......	$90.00

A display board of heavy to light work specimens fashioned by the use of the TOTE-WELD outfit is shown and each operation is demonstrated. This presentation illustrates that TOTE-WELD cannhandle heavy-duty operations.

Contents:

Oxy-fuel welding and cutting processes: cutting and piercing one-inch steel;;cutting bolts up to 1-1/4" in diameter; silver brazing and soldering brass sheet metal and copper tubing; bronzebbrazing of light and heavy gauge steel; aluminum brazing; welding thin gauge steel;;heating and bending one-inch solid steel bar; and angle iron fabrication - cutting, piercing, and mitering.

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TECHNIQUES

Peening, Finishing, and Assembly

Bergwall Productions, Inc., Garden City, N.Y. (Edu-Media Holdings, Kitchener, Ont.)
(505)..$28.00

Colour Filmstrip/Cassette/Teacher's Guide.

A complete look at the peening operation and the different methods of finishing metal are presented. The processes of riveting and brazing used in the assembly of wrought iron bench projects are shown and explained.

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TORCH TECHNIQUES

Oxy-acetylene Welding: Torch Techniques

BFA Educational Media, Santa Monica, Calif. (Holt, Rinehart and Winston, Toronto, Ont.)
(10943) Purchase....................................$295.00
Rental..$18.00

16mm Colour Film. Time: 19-1/4 mins.

Exceptional lighting and photography allow the viewer to closely study the correct techniques for running a bead, welding without a rod, adding a rod to a butt weld, and brazing.

Recommended Levels: Senior High, College, and Adult Education.

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VOCABULARY

Oxy-acetylene Welding Vocabulary

Mafex Associates, Ltd., Johnstown, Penna. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (64 Frames). Time: 11:29 mins.

Students will become familiar with the vocabulary in the other filmstrips of the Mafex series with the help of this filmstrip. It gives the word and picture of the item visually and the narrator gives the correct pronunciation and a short explanation. The vocabulary is basic to a welder's needs, and the welding student may research references which add to their knowledge.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

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WELDING: OXY-ACETYLENE EQUIPMENT SERIES

Introduction to and Lighting Up (T.5 Part I)
Welding (T.6 Part II)
Brazing (T.7 Part III)
Cutting (T.8 Part IV)

Marine Audio Visual Instructional Systems Ltd., London, England.
(Electrolab Ltd., Belleville, Ont.)
....$465.00/Set
....$125.00 Each

16mm Filmstrip/Tape in a Commpak cartridge designed for use in the La Belle projectors.

This series of four programmes was designed as a self-teaching trade course to be used on the workbench in conjunction with the oxy-acetylene equipment. Safety procedures are fully explained.

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WELDING AND CUTTING SERIES

Linde Division, Union Carbide Corp., Long Island City, N.Y.
(Union Carbide Canada Ltd., Toronto, Ont.)

16mm Colour/Sound Filmstrips

1. *Braze Welding*

Purchase	$180.00
Rental-One Showing	$20.00

1972. Time: 13 mins.

The correct techniques for braze welding of sheet steel, plate and castings are demonstrated. The filmstrip also shows the setting up of the welding equipment, adjusting oxygen and acetylene pressures; lighting the welding torch; and properly adjusting the flame for braze welding.

2. *Flame Cutting*

Purchase	$165.00
Rental-One Showing	$15.00

1973. Time: 11 mins.

The proper techniques for cutting steel and iron are demonstrated as well as how to start a cut at the edge of the plate, how to start in from the edge by piercing a hole in the plate, and how to restart a lost cut. Step-by-step instructions are given for making straight line cuts, irregular shapes, beveling plate edges, and circle cutting.

3. *Flame Grooving*

Purchase	$165.00
Rental-One Showing	$15.00

1973. Time: 10 mins.

Instructions are given for finishing castings, preparing plate and casting for welding, cutting out old welds, and gouging out surface defects and other unwanted metal.

4. *Fusion Welding*

Purchase	$165.00
Rental-One Showing	$15.00

1973. Time: 10 mins.

The techniques are shown from the operation and adjustment of the welding equipment through to multi-pass fusion welding of heavy steel plate. With animation and live demonstrations, the proper torch, rod movement, and weld puddle control techniques are shown.

5. *Fusion Welding of Light Gauge Steel*

Purchase	$165.00
Rental-One Showing	$20.00

1973. Time: 11 mins.

The do's and don'ts of fusion welding of thin sheet metal steel are demonstrated by close-up action shots and animation. The common faults in welding thin sheet metal are also demonstrated. Emphasis is placed on the correct torch and rod manipulation necessary for fusion welding of light gauge steel.

6. *Hard-Facing*

Purchase	$155.00
Rental-One Showing	$15.00

The correct techniques for applying a hard-facing alloy to the surface of steel parts are demonstrated. Flame adjustment and the preheating of the part to be hard-faced are shown by demonstration and animation sequences. The correct technique for hard-facing thin-edged parts without damaging the edge is also shown.

Recommended Levels: High School and Adult Education.

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WELDING EXPLAINED: OXY-ACETYLENE FUSION SERIES #902

Bergall Productions Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)

....$166.00/Set
....$35.00/Each

Colour Filmstrips (71-86 Frames Each)/Cassettes (10-13 Minutes Each)/Teacher's Guide

1. *Basic Nomenclature*

The various sizes, construction, and capacity of oxy-acetylene cylinders are explained. Oxygen and acetylene regulators and pressure gauges are completely detailed. Full instructions for installing the regulators and assorted equipment on the cylinders are included.

2. *Preparing the Unit for Welding*

All parts of the welding torch are explained. Step-by-step procedures for setting up the unit for welding are given. All safety gear is detailed along with how to charge the torch with welding gases.

3. *Lighting and Adjusting the Welding Flame*

   This filmstrip begins with a safety check for fire extinguishers and safety gear. The student is shown how to purge the lines, light the torch, use a flint friction lighter, adjust to a neutral flame, and test the flame. The full shut down procedure is explained.

4. *Fusion Welding: Basic Application*

   The difference between fusion and non-fusion welding is explained. The complete procedure for selecting the tip and testing the flame is shown. Also covered are: how to correct an oxidizing or carburizing flame; torch and rod angle; torch rotation; and how to maintain a molten pool.

5. *Fusion Welding: Varying Applications*

   This filmstrip shows how to weld a lap joint, fillet joint, and an outside corner. Complete instructions are given on vertical welding and how to tack a weld. Tip and torch angles are stressed. All safety procedures, as well as adjusting to neutral flame, are demonstrated.

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WELDING EXPLAINED: OXY-ACETYLENE NON-FUSION SERIES #901

Bergwall Productions, Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)
....$166.00/Set
....$35.00 Each

Colour Filmstrips (71-86 Frames Each)/Cassettes (10-13 Minutes Each/Teacher's Guide

1. *Basic Nomenclature*

   Same as #902, Part 1.

2. *Preparing the Unit for Welding*

   Same as #902, Part 2.

3. *Lighting and Adjusting the Welding Flame*

   Same as #902, Part 3.

4. *Non-Fusion Welding: Basic Applications*

   The filmstrip opens with welding safety, where to weld, and what safety gear to wear. The torch and rod angle are explained. The correct tip rotation and tip to work distance are demonstrated via close-up photography. Also shown is the method of making a correct weld and bridging.

5. *Non-Fusion Welding: Varying Applications*

The how-to methods are shown such as welding a lap, butt and fillet joints, and an outside corner. The correct tip and filler rod angles are stressed throughout. This filmstrip also shows how to bring the various joints to brazing heat, and the proper techniques for controlling heat.

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WELDING STEEL

Oxy-Acetylene Welding: Welding Steel

BFA Educational Media, Santa Monica, Calif. (Holt, Rinehart and Winston, Toronto, Ont.)

(10959) Purchase	$225.00
Rental	$15.00

16mm Colour Film. Time: 14 mins.

The advanced techniques of gas welding are shown including multiple pass (thick plate) joining, structural section fabrication, and forming horizontal, vertical, and overhead welds.

Recommended Levels: Senior High, College, and Adult Education.

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VIII

OXYACETYLENE WELDING AND CUTTING PACKAGED COURSES

COUPAGE ET SOUDAGE OXYACÉTYLÉNIQUES COURS

CAREERS IN WELDING SERIES

Oxy-acetylene Welding and Cutting:

Introduction to Oxy-acetylene Welding
Welding Equipment Orientation
Equipment Set-up and Basic Welds
Stringer Beads, Butt, and Lap Joints
Tee and Corner Welds
Heavy Gauge Metal Exercises
Horizontal Applications
Vertical Applications
Overhead Position Welding
Brazing
Welding Cast Iron and Hard Surfacing
Introduction to Flame Heating
Fundamentals of Flame Cutting
Multiple Uses of Flame Cutting

Ken Cook Education Systems, Butler, Wis. (Electrolab Ltd., Belleville, Ont.)

(1272) Complete	$1680.00
(1247) SR 100 Student Workstation	$1200.00
(1234) SR 100 Student Console	$825.00
Individual Programs	$120.00/Each
(1286) Instructor's Manual	$8.95
(1275) Class Schedules (10)	$1.50
(1273) Student Worksheets (25 Sets - 16 Each Set)	$25.00
(1278) Student Test Sheets (25 Sets - 15 Each Set)	$11.25
(1274) Student Certificates (25)	$3.75

Complete Course: 14 Programs/1 Instructor's Manual/10 Class Schedules/50 Student Manuals/50 Student Test Sets/50 Student Certificates

This course provides, on an individualized basis, an opportunity for students to learn the basic theory and practices of gas welding and cutting. Students, having no prior experience in gas welding, are able to perform a wide variety of hands-on work assignments. Safety precautions and the proper care and use of equipment are presented and stressed throughout the course. On a step-by-step basis, students prepare the equipment and perform various welding and flame cutting operations. The Workbook exercises are integrated throughout the hands-on training. This course illustrates the use of Victor welding equipment, however, the instruction can be used in conjunction with most brands of oxy-acetylene welding and cutting equipment. Victor equipment can be supplied with the course.

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CUTTING AND TACKING

Oxy-acetylene Cutting and Tacking

E.I. Du Pont De Nemours & Co. (Inc.), Wilmington, Del. (Du Pont of Canada Ltd., Montreal, P.Q.)
(11)...$11.00

Instruction Time: 4 Hrs.

This self-study course was designed for students with little or no background in the specific areas of learning. It consists of a predetermined amount of subject matter which has been broken into small bits of information. These bits are incorporated into frames on a course plan. The trainee reads the frame, answers a specific question, then compares the correct answer with his own before proceeding. The course can also be a part of a regularly scheduled program.

Contents:

Types of oxy-acetylene flames; Equipment, including the welding torch, tips, hoses, and pressure regulators; Gas cylinders; cylinder and working pressures; and Operating procedures such as opening cylinders, adjusting working pressures, lighting a torch, adjusting the flame, and shutting off the torch. A practical performance test to measure the ability of the student, and a check list for the examiner are included.

Prerequisite: Average reading ability, and familiarity with the terms pressure, temperature, psi, and °F.

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OXY-ACETYLENE WELDING MULTIMEDIA PROGRAM

Jam Handy Organization, Detroit, Mich. (Prentice-Hall of Canada Ltd., Scarborough, Ont.)
(KD 72003-100) Complete Course...........................$293,00
Filmstrip.............................$17.25/Each
Film Loop.............................$32.20/Each

4 Colour/Silent Filmstrips with Captions/13 Transparencies/10 Film Loops/10 Spiritmasters/1 Instructor's Guide

This program presents the basic welding theory and modern welding practice. Each component treats a particular subject in depth--from equipment and safety to the actual welding operations. Single elements may be easily extracted to emphasize individual operations. The students see the basic manipulative skills required to produce good welds in the film loops. They view the skills over the shoulder of the welder. The transparencies provide complete coverage of the basic oxy-acetylene welding equipment. Using large projected images with overlays, the construction of the cylinders, regulators, gauges, torches, and manifold are clearly visible. The spiritmasters provide work sheets for reviewing all the information, assisting the instructor in spotting problems, and allowing the students to keep track of their own progress. The Instructor's Guide offers suggestions for organizing the materials and for designing lead-in and follow-up activities.

Filmstrips:

1. *Safety*

   The fact that oxy-acetylene welding is no more hazardous than other trades--if the proper safety rules and precautions are observed--is illustrated.

2. *Flames*

   Students learn how to identify the various types of flames by their effects on the molten pool. Carburizing, neutral and oxidizing flames, and the chemistry of the oxy-acetylene flame are shown in detail.

3. *Edge Preparation and Joint Assembly, Part I*

   The steps to follow for edge preparation in joint assembly are shown. Groove joints, single and double bevels, single and double vees, and the single J are introduced. The filmstrip stresses vocabulary, reasoning, and the practical application of the theory.

4. *Edge Preparation and Joint Assembly, Part II*

   This is a continuation of Part I showing the double J, and the single and double U and Tee joints.

Film Loops:

1. *Adjusting Gas Pressures with Torch Valves Closed and Lighting the Torch*
2. *Adjusting Gas Pressures with Torch Valves Open and Lighting the Torch*
3. *Flame Effects on Molten Pool*
4. *Lines of Fusion (Beads without Rod)*
5. *Weld Beads Using Filler Rod*
6. *Fillet Welds*
7. *Edge and Flange Joints*
8. *The Corner Joint*
9. *The Square Butt Joint*
10. *Braze Welding Beads*

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WELDING, CUTTING AND BRAZING "PAT" WELDING TRAINING COURSE

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(030.0)	Complete Course	$660.00
(030.40)	Instructor's Guide	$40.00
(030.41)	4 Written Tests (50 Copies Each)	$17.50
(030.42)	"PAT" Examination Kit	$75.00
(EW-269)	Student Workbook	$3.00
(EW-385)	Hobart Welding Guide	$3.50

Super 8 Continuous Loop Training Film Cartridges/Cassette Tape Recorded Commentary/Instructor's Guide/Welding Process Manual/ Student Workbook

Precise information is given for ordering base metal and filler metal for each job practice. Each topic is summarized with supplementary information, workpiece layouts for job practices, typical student pitfalls, and job practice objectives. The sound films on each topic include lecture/discussions to orient the student and introduce the material related to welding, and job practices for demonstrating the welding techniques. They may be viewed by individuals for makeup or additional study or by complete class groups. The Instructor's Guide includes: a chart which lists all the topics in order with the required material; a chart listing the daily class schedules; supplementary information on each topic; master copies of written tests; a welding textbook; and a student workbook which is coordinated with the audio visual material. Written tests are provided as a measure of student understanding and physical tests are included in the job practices. The "PAT" Examination Kit consists of selected audio visual (film/tape) lesson topics and a complete Instructor's tor's Guide. The step-by-step skill development that is demonstrated by live action in the film is summarized in the same step step-by-step procedure in the workbook which provides reference for the welder in the booth. Lecture material is outlined in the workbook for review.

Topics:

1. *Lecture/Discussion, Introduction to Oxy-acetylene Welding*
2. *Lecture/Discussion, Safety Precautions for Oxy-acetylene Welding and Cutting*
   ....$60.00

3. *Lecture/Discussion, Assembly of Equipment and Preparation f for Welding*
4. *Stringer Bead, Flat Position, Without and With Filler Metal*
   ....$55.00

5. *Fillet Weld, Lap Joint, Horizontal Position*
6. *Fillet Weld, Inside Corner Joint, Horizontal Position*

....$35.00

7. Fillet Weld, Inside Corner Joint, Vertical Position, Up
8. Fillet Weld, Lap Joint, Vertical Position, Up
....$40.00

9. Lecture/Discussion, Weld Quality Inspection
10. ....$40.00

10. Square Groove Weld, Butt Joint, Flat Position
11. Square Groove Weld, Butt Joint, Vertical Position, Up
....$40.00

12. Square Groove Weld, Butt Joint, Overhead Position
13. Square Groove Weld, Butt Joint, Horizontal Position
....$35.00

14. Lecture/Discussion, Introduction to Flame Cutting (Manual and Machine)
15. Square and Bevel Cut, Flat Position, Manual
16. Square and Bevel Cut, Flat Position, Manual, Visual Test
....$65.00

17. Single Vee Groove Weld, Butt Joint, Flat Position
18. Single Groove Weld, Guided Bend Test
....$45.00

19. Single Vee Groove Weld, Butt Joint, Vertical Position, Up
20. Single Vee Groove Weld, Butt Joint, Overhead Position
....$50.00

21. Single Vee Groove Weld, Butt Joint, Horizontal Position
....$35.00

22. Lecture/Discussion, the Application of Fuel Gases for Welding and Cutting
....$45.00

23. Single Vee Groove Weld, Butt Joint, Pipe Welding, 5G Position
24. Single Vee Groove Weld, Butt Joint, Pipe Welding, 2G Position
....$60.00

25. Lecture/Discussion, Introduction to Brazing and Braze Welding
26. Square Groove Braze Weld, Butt Joint, Flat Position
....$55.00

27. Fillet Braze Weld, Corner Joint, Cast Iron, Flat Position
28. Fillet Braze Weld, Corner Joint, Cast Iron, Flat Position,
29. Break Test
Fillet Braze, Lap Joint, Copper, Horizontal Position

29. *Fillet Braze, Lap Joint, Copper, Horizontal Position*
....$50.00

30. *Square Groove Weld, Butt Joint, and Vertical Position, Up Flat*
31. *Edge Bead Weld, Hard Surfacing*
....$50.00

IX

SPECIALIZED WELDING

SOUDAGE SPECIALISÉ

FUSION

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
....$25.00 Each

Regular 8mm/Super 8mm Silent Films

1. *Fusion Welding I* (301/C3)

   The distinctions between the thermal situations of soldering, brazing and the welding processes are shown. Illustrations are given for neat efficient fusion-welded joints.

2. *Fusion Welding II* (301/C4)

   Illustrations of the elements of molecular interlocking and the role of fluxing are given. There is also a demonstration of the mechanism of filler metal transfer across the flux protected arc gap in electric arc welding.

Recommended Levels: Secondary, Further, and Industrial Education.

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HAND OPERATIONS - METALWORK SERIES

Welding

Moreland-Latchford Productions Ltd., Toronto, Ont.
(International Tele-Film Enterprises Ltd., Toronto, Ont.)
(2-610)..$175.00

16mm Colour Film. Time: 13 mins.

The parts of the welding equipment are indicated, and the lighting-up procedure is shown. The actions cover the adjustment for a proper flame and the correct shutting-down procedure. Making a puddle, running a bead, adding filler, brazing, and the use of flux are all covered graphically. Close-ups emphasize finer points and a final segment shows the torch used to cut metal. (Also available in French.)

Recommended Levels: Intermediate, Senior, and Adult Education.

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PROCESSES

Ways to Weld

Linde Division, Union Carbide Corp., Long Island City, N.Y.
(Union Carbide Canada Ltd., Toronto, Ont.)

Purchase	$300.00
Rent	$75.00
Preview	$30.00/2 Wks.

16mm Colour/Sound Motion Picture. Time: 20 mins.

This is not a "how-to" film but a detailed presentation of the welding processes, welding equipment, applications, and advantages and disadvantages of each. It was designed to give the novice welder and/or welding student a detailed insight into what is involved in such welding processes as oxy-acetylene, stick electrode, M.I.G., T.I.G., and submerged arc.

Contents:

Welding processes: gas welding (oxy-acetylene); shielded metal arc welding (stick electrode); gas metal arc welding (M.I.G.); gas tungsten arc welding (T.I.G.); and Submerged arc welding. Related processes and techniques: Fusion welding; Flame cutting; and Electroslag welding. Advanced welding processes: Resistance welding; Ultrapulse welding; Plasma arc welding and cutting; Electron beam welding; and Laser welding and cutting.

Recommended Levels: Technical and Vocational Schools and Industrial Training Courses.

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PROCESSES

Welding Processes

Metallurgical Services Laboratories Ltd., Surrey, England.
(Micro-Metallurgical Ltd., Thornhill, Ont.)

	$143.00/Set
Protective Binders for Plastic Wallets	$7.50

44 Colour Slides

This set of high quality slides illustrates the fundamentals of the welding processes complete with lecture notes for those unfamiliar with the details of welding technology. The set covers the processes of: manual metal-arc; M.I.G.; submerged-arc; T.I.G.; gas; electroslag; electrogas; resistance; stud; flash; friction; arc-plasma; electron-beam; laser; thermit; and explosive welding. A sheet of black and white prints is available upon application in order that one may judge the value of the slides for their particular purpose before placing the order.

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SERIE DE METAL - TRAVAIL A LA MAIN

Soudure 2

Moreland-Latchford Productions Ltd., Toronto, Ont.
(Les Entreprises Internationales Tele-Film Ltée., Montreal, P.Q.

Vente	$210.00
Location	$16.00

Film 16mm en couleur. Durée: 13 min.

On voit les parties du matériel à souder et comment allumer une lampe à souder. On présente la manière d'ajuster la flamme et comment fermer les valves lorsque la soudure est terminée. Il y a aussi le bain de fusion, le cordon de soudure, le brasage et l'utilisation du décapant. Les gros plans présentent les détails de la soudure et finalement on voit le chalumeau qui sert à couper le métal.

Niveau Scolaire: Sécondaire 1, 2, 3 et Tous.

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SHEET METALWORK SERIES

Seams and Joints

Jam Handy Organization, Detroit, Mich. (Prentice-Hall of Canada, Ltd., Scarborough, Ont.)

	$25.00
Filmstrip	$17.25
Cassette	$12.65

Colour Filmstrip/Cassette/Instructor's Guide. 1978.

The basic procedures, safety precautions, and the correct use of the tools to carry out the basic operations are introduced.

Contents:

Standing seams are formed and shaped; and Grooved seam and dovetail joint are shown in a step-by-step procedure.

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TRAINING IN WELDING SERIES

Audio Brandon (Macmillan), Mt. Vernon, N.Y. (Marlin Motion Pictures, Ltd., Mississauga, Ont.)

16mm Film

Each film, using demonstration and animation, shows both the basic technique and the wide number of applications for that technique.

1. *The Air-acetylene Flame*. 1972. Time: 10 mins. $165.00
2. *Flame Grooving*. 1973. Time: 10 mins. $165.00
3. *Flat and Horizontal Welding*. 1973. Time: 12 mins. $170.00
4. *Hard Facing*. 1973. Time: 10 mins. $155.00
5. *Introduction to Manual Heliarc Welding*. 1973. Time: 8 mins. $145.00
6. *Setting Up For Welding*. 1973. Time: 12 mins. $170.00
7. *Vertical and Overhead Welding*. 1973. Time: 10 mins. $160.00

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X

ADVANCED WELDING
PRINT MATERIALS

SOUDAGE AVANCÉ
MATÉRIEL IMPRIMÉ

Aluminum Welding Qualification Code

Canadian Standards Association. Rexdale, Ont.: Author, 1967.
(W47.2-1967)..$6.00

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Annular Projection Welding of Tubular Sections to Low Carbon Steel Sheet

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(35) Bulletin...$1.75

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Arc Stud Welding Fundamentals

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 1974, 16 pp. (EICO Canada Ltd., Richmond Hill, Ont.)
....$ .50

This booklet covers very briefly the process, power source, guns, controls, studs, weld time, and the recommended procedures and techniques. The ease of performing an arc stud weld is also explained.

Contents:

Process, equipment; The system, power source; Arc stud welding guns; Stud welding controls; The welding stud; Arc shields (ferrules); Recommended procedures and techniques; Weld inspection and troubleshooting; Suggested Miller power sources; and Typical uses of the arc stud welding process.

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Basic T.I.G. and M.I.G. Welding

Griffin, I.H., Roden, E.M., & Briggs, C.W. Albany, N.Y.: Delmar Publishers, 1977, 128 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$4.50
Instructor's Guide...$ .75

This highly illustrated text-workbook provides the basic skills in tungsten-inert-gas (T.I.G.) and metallic inert-gas (M.I.G.) welding. The answers to the reviews and test are in the Instructor's Guide.

Contents:

T.I.G. welding; The tungsten inert-gas shielded-arc welding process; Equipment for manual T.I.G. welding; The water-cooled T.I.G. welding torch; The welding of aluminum; The action in and around the welding arc; Fundamentals of T.I.G. welding; Starting an arc and running stringer beads on aluminum; Running parallel stringer beads on aluminum; Outside corner welds on aluminum; Butt welds on aluminum; Lap welds on aluminum; Fillet welds on aluminum; Flanged butt welds on aluminum; Welding magnesium and magnesium alloys; T.I.G. welding stainless and mild steel; Welding copper and copper-base alloys; T.I.G. welding nickel and nickel-base alloys; M.I.G. welding; The metallic inert-gas welding process; Equipment for manual M.I.G. welding; M.I.G. welding variables; Establishing the arc and making weld beads; M.I.G. welding the basic joints; Procedure variables; M.I.G. welding aluminum; M.I.G. welding stainless steel; M.I.G. welding copper; Flux-cored CO_2 shielded M.I.G. welding; and M.I.G. spot welding.

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Certification of Companies for Fusion Welding of Steel Structures (25 Revisions)

Canadian Standards Association. Rexdale, Ont.: Author, 1973.
(W47.1-1973)..$7.00

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Classification and Application of Welded Joints for Machinery and Equipment

American Welding Society. Miami, Fla.: Author, 1977, 74 pp.
(Canadian Welding Society, Weston, Ont.)
(D14.4-77)..$13.20

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CO_2 Welding Manual

Hobart School of Welding Technology. Troy, Ohio: Author, recent, 40 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-208)..$1.50

A description of the CO_2 gas shielded-arc welding process, the application and procedures is given.

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Cost Considerations of a Welding Process

Miller Electric Manufacturing Co. Appleton, Wis.: Author,
(EICO Canada Ltd., Richmond Hill, Ont.)
....$ .50

This booklet serves as a key to the costs of gas metal-arc (M.I.G.) welding before striking the arc.

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Dispositions soudées recommandées pour fixation d'organes connexes sur les récipients à pression

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18:
Auteur, 72 pp.
(IIS/IIW 237-66)

Sous ce titre une réédition vient d'être faite du document de l'Institut International de la Soudure qui a pour but de diffuser les recommandations de la Commission XI Récipients à pression, chaudières et tuyauteries de l'IIS quant aux dispositions constructives et d'exécution relatives à la fixation d'organes connexes sur les récipients à pression en acier au carbone, soudés manuellement à l'arc. En outre, et ceci constitue une nouveauté, cette réédition est accompagnée, cette fois, d'un supplément également établi par la Commission XI de l'IIS et qui, sous l'intitulé Echelonnement d'aptitude à l'emploi, constitue un guide appréciant la qualité et(ou) le choix d'un certain nombre d'assemblages recommandés.

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Effect of Zinc Coatings on Resistance Seam Welding of Sheet Metal

Resistance Welder Manufacturer's Association. Philadelphia,
Penna.: Author.
(30)...$1.00

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Electrical and Metallurgical Characteristics of Mash Seam Welding

Resistance Welder Manufacturer's Association. Philadelphia,
Penna.: Author.
(21)...$1.00

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Electrical Calculations for Resistance Welders

Taylor-Winfield Corp. Warren, Ohio: Author, 8 pp. (F-H Welding Machines Ltd., Mississauga, Ont.)
(SP-8A) Bulletin

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Electro-Brazing Methods

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(6) Bulletin..$1.00

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Electron Beam Welding

Miller, K.J., & Takenaka, T. New York, N.Y.: Welding Research Council, Oct. 1964.
(100) Bulletin..$1.00

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Electron Beam Welding

American Society for Metals. Metals Park, Ohio: Author, 1978.
(312)..$30.00

This is a computer-generated bibliography.

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Electron Beam Welding: Principles and Practices

Meleka, A. New York, N.Y.: McGraw-Hill International Book Co., 1971, 328 pp. (McGraw-Hill Ryerson Ltd., Scarborough, Ont.)
....$17.75

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Electroslag, Electrogas, and Related Welding Processes

Campbell, H. New York, N.Y.: Welding Research Council, Sept. 1970.
(154) Bulletin..$1.50

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Electroslag Welding

Paton, B.E. (Ed.). Miami, Fla.: American Welding Society, 1962, 468 pp. (Canadian Welding Society, Weston, Ont.)
(EW)...$13.25

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Elementary T.I.G. Welding Skills

Pierson, J.E., III. New Brunswick, N.J.: Curriculum Laboratory, Rutgers University, Oct. 1974, 125 pp.
....$5.75

The text, prepared to help deaf students develop skills, uses simplified language and illustrations to present concepts which should be reinforced by practical experience with welding skills. Each of the 12 lessons contains: an information section with many illustrations; an outlined review of the material presented; and a list of objective questions to check the comprehension of the lesson.

Contents:

Preparing to be a safe welder; Using electricity in welding; Identifying T.I.G. welding equipment; Selecting tungsten electrodes; Using inert gas; The action of the arc; Using the torch in the flat position; Establishing the arc; Making a butt weld; Making a fillet weld; Welding aluminum; and Welding stainless steel.

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FabCO Welding Manual

Hobart School of Welding Technology. Troy, Ohio: Author, 125 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-301) English...$3.00
(EW-301-F) French..$3.00

The FabCO cored wire welding process, equipment, applications and procedures are throughly covered.

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Flash Butt Welded Joints, Their Design and Properties

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(12)...$2.00

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Flash Butt Welding Technique and Variables in Welding Low Alloy Steels and Flash Welding Alloy Steels: Physical and Metallurgical Characteristics

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(10) Bulletin..$3.00

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Flash Welding: The Process and Applications of Flash Welding - Process Variables and Weld Properties

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(32) Bulletin..$1.50

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Forging

American Society for Metals. Metals Park, Ohio: Author, 1978.
(315)..$30.00

This is a computer-generated bibliography.

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Friction Welding

Wang, K.K. New York, N.Y.: Welding Research Council, Apr. 1975.
(204) Bulletin..$6.50

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Friction Welding of Metals

Vill, V.I. Miami, Fla.: American Welding Society, 1962, 112 pp.
(Canadian Welding Society, Weston, Ont.)
(FW)..$8.80

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Fundamentals of Gas Metal-Arc (M.I.G.) Welding

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 1971, 37 pp. (EICO Canada Ltd., Richmond Hill, Ont.) ....$ .75

The booklet was written to furnish a basic understanding of the M.I.G. welding process and may be used as a collective source of material for welding training courses. The illustrations and principles are to be used merely as a reference for a flow of ideas and may, in some instances, be subjects for discussions.

Contents:

Introduction; Short circuiting process; Spray arc process; Welding current selection; Arc current selection; Welding voltage; Power supplies; Slope control; Voltage effect in welding; Selection of wire type and wire size; Arc voltage; Slope; Inductance; Transition point; and Short circuiting theory.

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Fundamentals of Heat Flow in Welding

Myers, P.S., Uyehara, O.A., & Borman, G.L. New York, N.Y.: Welding Research Council, Mar. 1976. (123) Bulletin...$8.00

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Gas Metal Arc Welding

American Society for Metals. Metals Park, Ohio: Author, 1978. (317)..$30.00

This is a computer-generated bibliography.

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Gas Metal Arc Welding

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 1965, 83 pp. (EICO Canada Ltd., Richmond Hill, Ont.) $2.50

A complete discussion is given on the M.I.G. process with photographs and illustrations. The types of metal transfer, welding wire, welding machines, etc., are also covered. Charts are included as well as an explanation of the common terms used in the welding industry.

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Gas Metal Arc Welding

Vereschagin, A.I. Burnaby 2, B.C.: Division of Post-Secondary Education, Curriculum Development Branch, Department of Education, Nov. 1972, 66 pp. 1st Edition.
(6710-M-48)

This manual was written primarily for use in a ten-month welding vocational training course but would be helpful for students who wish to expand their knowledge to include gas metal arc welding. The information presented is suitable for the beginner as well as for the person taking upgrading, though a prior knowledge of welding would be an advantage.

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Gas Tungsten Arc (T.I.G.) Welding

American Society for Metals. Metals Park, Ohio: Author, 1978.
(330)..$30.00

This is a computer-generated bibliography.

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Guide du soudage - Tome V: Soudage à l'arc sous gaz de protection (T.I.G., M.I.G., et M.A.G.)

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 256 pp.

Sommaire:

Des propriétés physiques de l'arc électrique en atmosphère gazeuse; Des gaz de protection; Des divers procédés (T.I.G., M.I.G., et M.A.G.) de soudage sous gaz et des matériels utilisés pour leur mise en oeuvre; De l'application des procédés précédents au soudage des métaux usuels, ferreux ou non ferreux; Du contrôle des soudures; De l'automatisation des procédés, de soudage sous gaz; De diverses techniques connexes, telles que le procédé électrogaz et le soudage avec fil fourré; Des mesures de sécurité en soudage sous gaz; Le grand développement pris au cours de ces dernières années par les procédés de soudage sous gaz et le peu d'informations mises jusqu'à présent à la disposition des utilisateurs donnent à ce Tome V du *Guide du Soudage* un intérêt particulier.

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Guide for Steel Hull Welding

American Welding Society. Miami, Fla.: Author, 1976, 47 pp.
(Canadian Welding Society, Weston, Ont.)
(D3.5-76)..$5.50

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Guide for the Non-destructive Inspection of Welds

American Welding Society. Miami, Fla.: Author, 1977, 22 pp.
(B1.0-77)..$5.50

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Guide to the Welding and Weldability of C-Mn Steels and C-Mn Micro-alloyed Steels

American Welding Society. Miami, Fla.: Author, 99 pp. (Canadian
Welding Society, Weston, Ont.)
(CMN)..$12.00

A theoretical background is given for the standardization of such steels for use in national and international specifications. The Appendices include the compositions and properties of these steels made in ten foreign countries.

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Handbook for Spot Welding

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 1976,
27 pp. (EICO Canada Ltd., Richmond Hill, Ont.)
....$ .75

This is an illustrated guide for the selection and proper operation of resistance welders.

Contents:

Fundamentals of resistance spot welding; Heat generation; The time factor; Pressure; Electrode tips; Practical uses of resistance spot welding; Electrode tip size; Pressure or welding force; Heat balance; Surface conditions; Materials data for resistance spot welding; Mild steel; Low alloy and medium carbon steels; Stainless steels; Steels, dip-coated or plated; Aluminum and aluminum alloys; and a Summary.

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Heading and Upset Forging

American Society for Metals. Metals Park, Ohio: Author, 1978. (326)..$30.00

This is a computer-generated bibliography.

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High-Frequency Resistance Welding

Martin, D.C. New York, N.Y.: Welding Research Council, Apr. 1971. (160) Bulletin..$1.50

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High Performance Overlays by Bulkwelding

American Society for Metals. Metals Park, Ohio: Author, 1968. (D8.15.2)..$10.00

This is a technical paper.

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Hobart Welding Guide

Hobart School of Welding Technology. Troy, Ohio: Author, recent, 120 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.) (EW-385)..$3.50

Hard-to-find application and practical use information on stick electrodes, oxy-acetylene, and M.I.G. and T.I.G. processes is explained.

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Hot Wire Welding and Surfacing Techniques

Manz, A.F. New York, N.Y.: Welding Research Council, Jan. 1977. (223) Bulletin..$.7.50

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How to Adjust the CP-250-TS for Dipmatic Welding

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 12 pp.

(EICO Canada Ltd., Richmond Hill, Ont.)
....$ .50

Tips are given on how to obtain better M.I.G. welds. Six charts help illustrate the text.

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Hull Welding Manual

American Welding Society. Miami, Fla.: Author, 1962. (Canadian Welding Society, Weston, Ont.)
(D3.5-62)..$5.50

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Improvement of the Fatigue Life of Spotwelds

Choquet, J.A. New York, N.Y.: Welding Research Council, Feb. 1966.
(112) Bulletin...$1.00

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Johnson's Guide to the Welding Section of the Los Angeles Building Code

Johnson, J.R. Moab, Utah: Tail Feather, 1971, 42 pp. Paper.
(ISBN 0-911756-04-3) Paper...................................$2.00

The contents include text and illustrations relating to welder certification in structural steel, shop and field light gauge steel, and shop and field aluminum.

Contents:

Electrode identification; Standard welding symbols; Approved practices for welder qualification performance tests; Written standards and specifications; Self-study review questions; and a Special study supplement in Spanish.

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Joining Electronic Materials

American Society for Metals. Metals Park, Ohio: Author, 1968.
(D8-23.1)...$10.00

This is a technical report.

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Laser Welding and Cutting

Schwartz, M.M. New York, N.Y.: Welding Research Council, Mar. 1976.
(167) Bulletin..$7.50

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Long Stickout Welding: A Practical Way to Increase Deposition Rates

Hinkel, J.E. Cleveland, Ohio: Lincoln Electric Co., June 1971, 8 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(S115)..Free

This article was reprinted from the *Welding Journal.*

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M.I.G. Welding and Pulsed Power

Lesnewich, A. New York, N.Y.: Welding Research Council, Feb. 1972.
(170) Bulletin..$2.00

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M.I.G. Welding Handbook

Union Carbide of Canada Ltd. Toronto, Ont.: Author, 1974, 124 pp.
(791F18)..$3.60

Every aspect of the M.I.G. welding process is covered. The initial portion of the book is devoted to the equipment and consumables used in M.I.G. welding. There is a discussion of the welding torch and accessories, welding control and wire-feed motor, mechanized welding fixtures, and the power supply. Special attention is given to shielding gases and welding wires in two separate sections detailing their properties, welding characteristics, and their effects in the M.I.G. welding of various types of metals. A section covers the welding parameters and techniques - welding current, wire electrode extension, welding voltage, arc travel speed, torch position and motion--and their effects on the weld. General welding procedures and conditions are established for steel, aluminum, and copper, and alloys of these metals. Specific recommendations are given for each. Detailed tables of welding conditions accompany this section. The economics of the M.I.G. process are considered, and formulas are provided for calculating the basic welding costs. Weld defects and their causes, as encountered with M.I.G., are pointed out and the corrective action to be taken is specified. A special illustrated section of the book describes a number of actual M.I.G. welding case histories where other processes have previously been used.

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Maintenance Manual for Resistance Welding Machines

Resistance Welder Manufacturer's Association. Philadelphia, Penna: Author.
(14) Bulletin...$1.50

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Making Better Plastic Welds

Thomas, D.W. Cohasset, Mass.: Laramy Products Co., Inc., 1962, 64 pp. (EICO Canada Ltd., Richmond Hill, Ont.)
(36-2180)...$3.00

This practical how-to-do-it manual on thermoplastics welding contains illustrated step-by-step instructions on hand welding, speed welding, the types of equipment, and welding preparation. The temperature, speed and pressure recommendations are given for all common materials with special notes and exercises for training and familiarization courses. All Laramy torches are shown.

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Metal Finish Seam Welding

Resistance Welder Manufacturer's Association. Philadelphia, Penna: Author.
(24) Bulletin...$1.00

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Metal Inert Gas (M.I.G.) Welding

Espenschied, R.F. Urbana, Ill.: Vocational Agriculture Service, College of Agriculture, University of Illinois, 1972, 44 pp.
(3037)..$ .90

This instructional unit gives detailed coverage on the selection, adjusting, setting up and maintainance of the equipment; and the procedures used in welding different kinds of metal. Operational problems with possible causes and remedies are described for a variety of situations of non-functioning of equipment. In addition, the document has numerous tables, working diagrams, and troubleshooting guides.

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Method for Sampling Airborne Particulates Generated by Welding and Allied Processes

American Welding Society. Miami, Fla.: Author, 1976, 8 pp.
(Canadian Welding Society, Weston, Ont.)
(F1.1-76)..$4.00

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Micro-Wire Welding Manual

Hobart School of Welding Technology. Troy, Ohio: Author,
150 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-300)...$1.50

The fine wire CO_2 (micro-wire) welding process, equipment, procedures, and applications are covered.

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The Microworld of Joining Technology

Slemmons, J.W. Miami, Fla.: American Welding Society, recent,
48 pp. (Canadian Welding Society, Weston, Ont.)
....$2.50

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Operator's Handbook: Gas Metal-Arc (M.I.G.) Troubleshooting Welding Processes and Equipment

Miller Electric Manufacturing Co. Appleton, Wis.: Author.
(EICO Canada Ltd., Richmond Hill, Ont.)
....$ .50

This guide gives the probable causes and possible remedies of M.I.G. problems.

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Plasma Metalworking Processes

O'Brien, R.L. Miami, Fla.: American Welding Society, recent, 50 pp. (Canadian Welding Society, Weston, Ont.) $2.75

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Porta-Slag Welding Manual

Hobart School of Welding Technology. Troy, Ohio: Author, 127 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.) (EW-412)..$3.00

This is the first American book on the electro-slag welding process, its equipment, procedures, and applications.

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Production Welding

Woods, P. New York, N.Y.: McGraw-Hill International Book Co., 1971, 192 pp. (McGraw-Hill Ryerson Ltd., Scarborough, Ont.) $11.95

A variety of methods and devices for improving the production in a welding shop are described.

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Productivity: Metals - Testing of Arc Welding Processes

Canadian Welding Society. Weston, Ont.: Author, 1973, 250 pp. $20.00

Contents:

Welding cost calculations; Tests and testing of materials; Nondestructive testing; Electric principles and power sources; Gas metal-arc and flux-cored welding; Productivity and costs in arc welding; Welding specifications and applications; Submerged arc welding; Tungsten inert gas welding; Electroslag; Plasma; Electron beam; Welding of stainless steels; and Welding of copper and copper alloys.

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Projection Welding of Low Carbon Steel with Embossed Projections

Harris, J.F., & Riley, J.J. Warren, Ohio: Taylor-Winfield Corp., 20 pp. (F-H Welding Machines Ltd., Mississauga, Ont.) (SP-27)

This paper presents data to assist in the selection of welding equipment and process variables for the welding of low carbon steel with embossed projections in the thickness range of .011" to .245".

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Radiographies de soudures

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 48 pp.

Etablie comme suite aux travaux de la Commission V de l'IIS, elle contient les reproductions de certains éléments de la *Collection de radiographies de références relatives aux soudures* et est essentiellement conçue pour répondre aux besoins de l'enseignement et montrer les défauts caractéristiques de soudures bout à bout sur acier, sous la forme où ils sont révélés par les radiographies. Celles-ci ont été réparties en cinq groupes selon le degré d'importance des défauts qu'elles mettent en évidence. En outre, les dessins précisent la position, dans les soudures, des différents défauts visibles sur les radiographies.

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Recommandations concernant les structures soudées en aluminium et alliages Al - Mg

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 94 pp.
(IIS/IIW 398-72)

Ces recommandations établies par un groupe d'Experts de l'Institut International de la Soudure, fournissent un ensemble d'informations à l'usage de tous ceux qui sont intéressés par les constructions en aluminium et alliages légers.

Chapitres

Caractéristiques mécaniques, physiques et chimiques du matériau; Procédés de soudage par fusion utilisables; Préparations pour soudage oxyacétylénique et soudage T.I.G. et M.I.G.; Calcul des assemblages; Conception des ouvrages soudés; et Fabrication et contrôle des assemblages soudés.

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Recommendations for Arc Welded Joints in Clad Steel Construction

American Welding Society. Miami, Fla.: Author, 66 pp. (Canadian Welding Society, Weston, Ont.)
(CS)...$4.50

The types of joint to be used in almost every conceivable combination of geometries or plate are described.

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Recommended Practices for Air Carbon - Arc Gouging and Cutting

American Welding Society. Miami, Fla.: Author, 1974, 29 pp.
(Canadian Welding Society, Weston, Ont.)
(C5.3-74)..$3.85

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Recommended Practices for Automotive Portable Gun Resistance-Spot Welding

American Welding Society. Miami, Fla.: Author, 1966, 16 pp.
(Canadian Welding Society, Weston, Ont.) $5.50
(D8.5-66)..$5.50

A supplement is also included.

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Recommended Practices for Automotive Welding Design

American Welding Society. Miami, Fla.: Author, 1961, 48 pp.
(Canadian Welding Society, Weston, Ont.)
(D8.4-61)..$3.85

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Recommended Practices for Plasma-Arc Cutting

American Welding Society. Miami, Fla.: Author, 1973, 13 pp.
(Canadian Welding Society, Weston, Ont.)
(C5.2-73)..$3.85

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Recommended Practices for Plasma-Arc Welding

American Welding Society. Miami, Fla.: Author, 1973, 68 pp.
(Canadian Welding Society, Weston, Ont.)
(C5.1-73)..$5.50

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Recommended Practices for Resistance Welding

American Welding Society. Miami, Fla.: Author, 1966, 115 pp.
(Canadian Welding Society, Weston, Ont.)
(C1.1-66)..$7.70

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Recommended Practices for Resistance Welding Coated Low Carbon Steels

American Welding Society. Miami, Fla.: Author, 1970, 11 pp.
(Canadian Welding Society, Weston, Ont.)
(C1.3-70)..$3.85

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Recommended Practices for Spot Welding Aluminum and Aluminum Alloys

American Welding Society. Miami, Fla.: Author, 1953, 31 pp.
(Canadian Welding Society, Weston, Ont.)
(C1.2-53)..$3.85

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Recommended Practices for Stud Welding

American Welding Society. Miami, Fla.: Author, 1974, 26 pp.
(Canadian Welding Society, Weston, Ont.)
(C5.4-74)..$3.85

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Reinforcing Steel Welding Code

Canadian Welding Society. Weston, Ont.: Author, 1975, 34 pp.
(D12.1-75)...$5.50

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Resistance Seam Welding

Schueler, A.W. New York, N.Y.: Welding Research Council, Apr. 1977.
(225) Bulletin..$7.50

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Resistance Seam Welding of Terne Plate - Evaluation of Resistance Seam Welds by a Shear Peel Test - High Speed Seam Welding of Terne Plate

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(33) Bulletin...$1.00

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Resistance Welding

American Society for Metals. Metals Park, Ohio: Author, 1978.
(338)...$30.00

This is a computer-generated bibliography.

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Resistance Welding: Theory and Use

American Welding Society. Miami, Fla.: Author, 1956, 160 pp.
(Canadian Welding Society, Weston, Ont.)
(RW)..$11.00

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Resistance Welding Equipment Standards

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author, 1966.
(16) Bulletin...$7.00

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Resistance Welding Fundamentals

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.

(13) Bulletin...$1.50

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Resistance Welding Manuals - Volume I and II

Resistance Welder Manufacturer's Association. Philadelphia,
Penna.: Author.
Volume I..$6.00
Volume II...$6.00
Set..$11.00

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Resistance Welding of Copper and Copper Base Alloys

Resistance Welder Manufacturer's Association. Philadelphia,
Penna.: Author.
(20) Bulletin...$1.00

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Resistance Welding of Miscellaneous and Dissimilar Metals

Resistance Welder Manufacturer's Association. Philadelphia,
Penna.: Author.
(19) Bulletin...$1.00

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Resistance Welding of Stainless and High Alloy Steels

Resistance Welder Manufacturer's Association. Philadelphia,
Penna.: Author.
(15) Bulletin...$1.50

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Resistance Welding Practice

Canadian Standards Association. Rexdale, Ont.: Author, 1957.
(W55.2-1957)..$9.75

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Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings

Canadian Standards Association. Rexdale, Ont.: Author, 1965.
(W55.3-1965)..$5.00

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Seam Welding Galvanized Steel

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(28) Bulletin...$1.00

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Seam Welding of Low Carbon and Stainless Steels

Taylor-Winfield Corp. Warren, Ohio: Author, 14 pp. (F-H Welding Machines Ltd., Mississauga, Ont.)
(SP-7A) Bulletin

This bulletin furnishes an explanation of how to make and test a seam weld in typical low carbon steels.

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Seam Welding of Low Carbon Steel and Seam Welding Dissimilar Thicknesses of Low Carbon Steel

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(23) Bulletin...$1.00

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Single Impulse Spot Welding of Low Carbon Steel

Taylor-Winfield Corp. Warren, Ohio: Author, 6 pp. (F-H Welding Machines, Mississauga, Ont.)
(SP-3A) Bulletin

This bulletin furnishes a simple explanation of how to make and test a spot weld in low carbon steel.

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Le soudage électrique par résistance

Negre, J. 75880 Paris, CEDEX 18: Publications de la Soudure Autogène, 1965, 524 pp.

Sommaire:

Soudage électrique par résistance: généralités; Le soudage électrique par points; Le soudage électrique à la molette; Le soudage électrique en bout: généralités, paramètres de soudage, matériel; et Quelques problèmes de soudage.

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Specification for Consumables Used for Electrogas Welding of Carbon and High Strength Low Alloy Steels

American Welding Society. Miami, Fla.: Author, 1978, 20 pp.
(Canadian Welding Society, Weston, Ont.)
(A5.26-78)..$5.50

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Specification for Consumables Used for Electroslag Welding of Carbon and High Strength Low Alloy Steels

American Welding Society. Miami, Fla.: Author, 1978, 20 pp.
(Canadian Welding Society, Weston, Ont.)
(A5.25-78)..$5.50

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Specification for Welding Earthmoving and Construction Equipment

American Welding Society. Miami, Fla.: Author, 1977, 47 pp.
(Canadian Welding Society, Weston, Ont.)
(D14.3-77)..$11.00

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Specification for Welding Industrial and Mill Cranes

American Welding Society. Miami, Fla.: Author, 1970, 27 pp.
(Canadian Welding Society, Weston, Ont.)
(D14.1-70)..$3.85

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Spot Welding 65-35 Brass on Single-Phase Equipment with Slope Control

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(25) Bulletin..$1.00

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Spot Welding of Inconel "X" in Thickness Range of .032 to .188

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(26) Bulletin..$1.00

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Spot Welding of Magnesium with Three-Phase Low Frequency Equipment

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(22) Bulletin..$1.00

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Spot Welding Properties of Rust-Proofed Mild Steel Sheet

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(9) Bulletin...$1.00

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Standard for Automotive Resistance Spot Welding Electrodes

American Welding Society. Miami, Fla.: Author, 1977, 67 pp.
(Canadian Welding Society, Weston, Ont.)
(D8.6-77)..$13.20

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Standard Methods for Mechanical Testing of Welds

American Welding Society. Miami, Fla.: Author, 1974, 60 pp.
(Canadian Welding Society, Weston, Ont.)
(B4.0-74)..$6.60

The 1977 revisions are included.

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Standard Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic Stainless Steel Weld Metal

American Welding Society. Miami, Fla.: Author, 1974, 16 pp.
(Canadian Welding Society, Weston, Ont.)
(A4.2-74)..$4.40

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Stick Power - ADC 1137B

Airco Welding Products. Union, N.J.: Author
(8242-0050)..$2.25

This is an instruction book on stick electrode welding theory and the composition and classifications of electrodes. It also instructs on the use of and contains a copy of the Airco *Electrode Pocket Guide, ADC 1107*. This pocket guide contains information on arc welding and the selection of electrode data.

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Structural Welding Code

American Welding Society. Miami, Fla.: Author, 1975, 166 pp.
(Canadian Welding Society, Weston, Ont.)
(D1.1-75) With Three-Ring Binder and Dividers.............$27.50
Soft Cover Bound Text..........................$25.00
Appendix E (8 Inspection and Qualification Forms)............................$4.00/pad of 100
(D1.2-77) Commentary
The criteria for design of welded connections, the required skills, procedure qualification, testing, and the strengthening and repair of existing structures are provided. The 1976 and 1977 revisions are also included.

Commentary on Structural Welding Code

American Welding Society. Miami, Fla.: Author, 1977, 45 pp.
(Canadian Welding Society, Weston, Ont.)
(D1.2-77)..$5.50

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Stud Welding

Shoup, T.E. New York, N.Y.: Welding Research Council, Apr. 1976.
(214) Bulletin..$6.50

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Submerged Arc Welding Manual

Hobart School of Welding Technology. Troy, Ohio: Author, 34 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-193)..$1.50

A description of the submerged arc welding process and its applications and procedures are given.

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A Test Program on Welding Iron Castings

American Welding Society. Miami, Fla.: Author, 1965, 27 pp. (Canadian Welding Society, Weston, Ont.)
(D11.1-65)..$3.85

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T.I.G. - Tungsten Inert Gas Welding Manual

Held, T. Burnaby 2, B.C.: Welding Department, British Columbia Vocational School and the Division of Vocational Curriculum, Technical Branch, Department of Education.

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T.I.G. and M.I.G. Welding

Vocational Curriculum Management Center. Olympia, Wash.: Author, 1973, 25 pp.

This course outline is intended to guide the student through the background knowledge and the skills necessary to become a proficient welder. It includes reference materials and suggested student activities.

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T.I.G. Welding - Tungsten Electrodes (W4001)
Torches, Hoses, Collets, and Cups (W4003)
Super-Imposed High-Frequency Stabilizing Current (W4004)
T.I.G. Filler Metals (W4005)
T.I.G. Shielding Gases (W4006)
Assemble, Set-Up and Shut Down of T.I.G. Equipment (W4007)
T.I.G. Welding - Equipment, Nomenclature and General Information (W4010)
T.I.G. Welding - Running Beads on Aluminum Without Filler Rod (W4101)
T.I.G. Welding with Filler Metal (W4101-1)

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author,
....$ .38 Each

The above are learning modules.

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Tip Life Studies in the Spot Welding of 5052 Aluminum Alloy

Resistance Welder Manufacturer's Association. Philadelphia, Penna.: Author.
(29) Bulletin..$1.00

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Tungsten Inert Gas (T.I.G.) Welding

Vocational Agriculture Service, College of Agriculture, University of Illinois at Urbana-Champaign. Urbana, Ill.: Author, 32 pp.
(3036)..$ .65

This printed pamphlet is intended for student text and reference use. It measures 8-1/2" x 11" in size and is punched for a three-ring notebook.

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Welded Aluminum Design and Workmanship (Inert Gas Shielded Arc Processes)

Canadian Standards Association. Rexdale, Ont.: Author, 1969.
(S244-1969)...$4.75

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Welded Steel Construction (Metal-Arc) Welding

Canadian Standards Association. Rexdale, Ont.: Author, 1977.
(W59-1977)..$25.00

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Welding Alcoa Aluminum

Aluminum Co. of America. Pittsburgh, Penna.: Author, 1972, 241 pp. (Alcoa International Canada Ltd., Etobicoke, Ont.)

The many changes that have occurred in the technology of welding aluminum alloys are reflected. New methods and improved techniques are brought to the reader. In addition to the basic and practical data on the individual processes, the book includes information on the choice of the method to be used. Tabular data and descriptions in this book should answer most routine questions about welding aluminum alloys.

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Welding and Brazing of Carbon Steels Series

American Society for Metals. Metals Park, Ohio: Author, 1976. Paperbound.
(31J)..$42.00/Set

Book 1: Arc Welding Processes

The shielded metal-arc process; gas metal-arc, flux-cored arc welding; and the grooves for arc-welding are explained, 172 pp.
....$13.00

Book 2: High Deposition Rate and Special Application Welding

Submerged-arc; electroslag, and electrogas welding; arc welding of hardenable carbon steels; and friction welding are covered, 140 pp.
....$11.00

Book 3: Resistance Welding Processes

Resistance spot, resistance seam, projection, flash, and stud welding are explained, 156 pp.
....$12.00

Book 4: Gas Welding and Brazing Processes

Gas welding, torch brazing, furnace brazing, induction brazing, resistance brazing, and dip brazing are covered, 172 pp.
....$13.00

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Welding and Soldering Numeetal and Electrical Steel 4750

Allegheny Ludlum Steel Corp. Pittsburgh, Penna.: Author, 4 pp.
....Free

This pamphlet discusses the materials used in welding and soldering and the effect of welding on magnetic properties.

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The Welding Encyclopedia

Jefferson, T.B. Lake Zurich, Ill.: Monticello Books, 1974, 1034 pp. 17th Edition. (Canadian Welding Society, Weston, Ont.)
....$18.25

Information on every known welding process is contained in this book along with the newer and developing processes. An extensive manufacturers' and product directory, a buyer's guide, and a comprehensive index are included.

Study Guide and Workbook

Jefferson, T.B. Lake Zurich, Ill.: Monticello Books, 1970, 224 pp. (Canadian Welding Society, Weston, Ont.)
....$4.20
Answer Book.......................................$1.50

This companion study guide and workbook contains two 25-lesson courses, one each for arc and gas welding. It was designed for classroom or self-study use. Each course outlines the theory to be covered and gives shopwork exercises, both supported by a suggested reference reading program. Every lesson concludes with a true/false quiz and each course has a 100-question final exam to ensure that the student has an overall grasp of the material. The answer book for the study guide gives the correct responses for the 831 questions.

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Welding Engineer Data Sheets

Jefferson, T.B. (Comp.). Lake Zurich, Ill.: Monticello Books,

1978, 186 pp. 8th Edition. Softcover. (Canadian Welding Society, Weston, Ont.)
....$6.00

Over 170 data sheets and monographs have been grouped into 14 categories to increase the book's convenience and usefulness. Particular emphasis is placed on how to estimate the costs of welding.

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Welding Handbook

Weisman, C. (Ed.). Miami, Fla.: American Welding Society, 1971. 6th Edition. (Canadian Welding Society, Weston, Ont.)

Section 3A: Welding, Cutting, and Related Processes (Common), 1970, 480 pp.
....$21.00

Contents:

Gas welding; Oxygen cutting; Arc cutting; Surfacing; High-frequency welding; Soldering; Electron beam welding; Electroslag welding; Thermit welding; and Friction welding.

Section 3B: Welding, Cutting, and Related Processes (Less Common), 1971, 480 pp.
....$21.00

Contents:

Explosion welding; Diffusion welding; Cold welding; Plasma-arc welding; Laser beam welding; Welding of plastics; Thermit welding; Flux-cored arc welding; Ultrasonic welding; Brazing; and Miscellaneous processes.

Section 4: Metals and Their Weldability, 1972, 645 pp.
....$24.00

Section 5: Applications of Welding (All Types of Industry), 1973, 580 pp.
....$24.00

Welding Handbook Index, 1974, 98 pp.
....$8.00

REPRINTS: Chapter 68: *Copper, Brass, Bronze*, 70 pp.
(RP68)..$2.00

Chapter 69: *Welding Aluminum*, 80 pp.
(RP69)..$3.50

Chapter 71: *Lead Welding*, 5 pp.
(RP71)...$1.00

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Welding Handbook

Weisman, C. (Ed.). Miami, Fla.: American Welding Society, 1978. 7th Edition. (Canadian Welding Society, Weston, Ont.)

Volume I: Fundamentals of Welding, 1978, 373 pp.
....$24.00

Volume II: Welding Processes: Arc and Gas Welding and Cutting, Brazing, and Soldering, 1978, 570 pp.
....$24.00

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Welding Inspection

American Welding Society. Miami, Fla.: Author, 1968, 238 pp. Clothbound. (Canadian Welding Society, Weston, Ont.)
(WI)..$11.00

The requirements and duties of the welding inspector, the welding procedures, specifications, and the qualification of both procedures and welders are presented. The author also discusses both weld defects and testing techniques.

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Welding of Maraging Steels

Lang, F.H., & Kenyon, N. New York, N.Y.: Welding Research Council, Feb. 1971.
(159) Bulletin....................................$3.00

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Welding of Metal-Matrix Fiber-Reinforced Materials

American Society for Metals. Metals Park, Ohio: Author, 1969.
(W9-23.2)...$10.00

This is a technical paper.

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Welding of Reinforcing Bars in Reinforced Concrete Construction

Canadian Standards Association. Rexdale, Ont.: Author, 1970.
(W186-1970)..$9.75

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Welding of Superalloy Turbine Hardware

American Society for Metals. Metals Park, Ohio: Author, 1968.
(D8-16.3)...$10.00

This is a technical paper.

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Welding Procedure and Performance Qualification

American Welding Society. Miami, Fla.: Author, 1977, 97 pp.
(Canadian Welding Society, Weston, Ont.)
(B3.0-77)...$13.20

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Welding Procedures: M.I.G. and T.I.G.

Schell, F.R., & Matlock, B.J. Albany, N.Y.: Delmar Publishers, 1978, 144 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$8.25
Instructor's Guide...................................$1.60

This text is designed to instruct the student in the operation of inert-gas welding equipment. Each unit discusses a particular joint design or welding procedure. Safety concepts and definitions of new terms are integrated throughout the text as they apply to various procedures. The self-instructional format provides welding exercises for the application of new concepts, and unit-end review questions test the student's comprehension with minimal aid from the instructor. The Instructor's Guide supplements the text with the answers to the review questions and also contains a time-allotment chart and suggested resources.

Contents:

Fundamentals of M.I.G. welding: setting up M.I.G. welding equipment; Running a bead, Spray transfer, Flat Position; Fillet weld, Spray transfer, Flat position; Testing welds. Welds in the flat position, Short arc technique: Striking the arc and adjusting the machine, short arc, flat position; Four layer stringer bead pad buildup, short arc, flat position; Butt weld with open root, short arc, flat position: Welds in the horizontal position, short arc technique; Horizontal position. Welds in the vertical position, short arc technique; Four layer stringer bead pad buildup, short arc vertical position; Fillet weld, short arc, vertical position. Welds in the overhead position, short arc technique; Four layer stringer bead pad buildup, short arc, overhead position. M.I.G. welding aluminum; Butt weld, flat position aluminum; Butt weld, horizontal position, aluminum; Fillet weld, vertical position, aluminum. M.I.G. welding stainless steel; Stringer beads, flat position, stainless steel; Fillet weld, vertical position, stainless steel: Fundamentals of T.I.G. welding. Setting up T.I.G. welding equipment; Lap weld, flat position, aluminum. Horizontal and vertical welds of aluminum, T.I.G. process; Lap weld, horizontal position, aluminum; Lap weld, vertical position, aluminum; T weld, vertical position, aluminum. Flat position welds of stainless steel, T.I.G. process; T Weld, flat position, stainless steel. Horizontal and vertical welds of stainless steel; Lap weld, horizontal position, stainless steel; T weld, vertical position, stainless steel. Review. Glossary. Acknowledgements.

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Welding Quenched and Tempered Steel

Lincoln Electric Co. Cleveland, Ohio: Author, 1977, 4 pp.
(M720)..Free

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Welding Technology

Giachino, J.W., Weeks, W., & Johnson, G.S. Chicago, Ill.: American Technical Society, 1973, 496 pp. 2nd Edition. (General Publishing Co. Ltd., Markham, Ont.)
....$10.75
Student Guide...$3.50
Answer Key for Student Guide..............................Free
Instructor's Answer Key...................................Free

This book supplies the technical background that enables the welder to make decisions and judgments. It is suitable for the second or advanced course. It is also suited for people who want to improve their welding techniques or to supervise the welding production. There are review questions for each chapter.

Contents:

Gas welding; Resistance welding; Special processes; Brazing, soldering; Design and testing; Economy, estimating; Welding symbols; Arc; T.I.G. and M.I.G.; Metallurgy; Weldability; Cutting; Strengths of materials; Safe working practices; and Surfacing.

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Welding Ultra-High Strength Steel Sheet

Schwartzbart, H., & Rudy, J.R. New York, N.Y.: Welding Research Council, July 1962.
(79) Bulletin..$1.00

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Welding Zinc-Coated Steels

American Welding Society. Miami, Fla.: Author, 1972, 131 pp.
(Canadian Welding Society, Weston, Ont.)
(D19.0-72)...$6.60

* * * *

DIE BONDING

Die Bonding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730011)

Colour/Sound Filmstrip (38 Frames). Time: 6:37 mins.

The two common methods for bonding dies to substrates are explained and illustrated. The first method shown is the epoxy bonding method. High magnification optics are employed to properly hand situate the small chips or dies. The second method is the eutectic process. The entire process from die orientation to the final bond is delineated in this filmstrip.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

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FABCO ARC

FabCO Arc Welding Installations

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-358)..$4.00

12-2" x 2" 35mm Colour Slides

The 12 applications of the semiautomatic continuous wire feed welding process using cored wire and CO_2 gas shielding are demonstrated.

* * * *

FAILURES

Fatique Failures and Brittle Fractures in Steel

Metallurgical Services Laboratories Ltd., Surrey, England.
(Micro-Metallurgical Ltd., Thornhill, Ont.)

XI

ADVANCED WELDING
NON-PRINT MATERIALS

SOUDAGE AVANCÉ
MATÉRIEL NON IMPRIMÉ

....$165.00/Set
Extra Notes...$4.50

8 Fracture Surface Replicas

This reference set shows fatigue failures and brittle fractures in steel. The specimens are supplied in a wooden carrying case measuring 345mm x 260mm x 45mm deep, complete with detailed notes printed on plastic laminated paper. The individual specimens making up the collection cover fatigue failures in fillet and butt welds and in a shaft build-up by welding. The brittle fracture specimens cover the initiation area and fracture propagation of inservice failures and test specimens show the cleavage and shear fractures.

* * * *

GAS METAL-ARC

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$1.25 Each

Wall Posters.

These wall posters measuring 35" x 28" are suitable for mounting.

1. *Gas Metal Arc-Welding CO_2 Shielding* (EW-326)
2. *Gas Metal-Arc Welding Inert Shielding* (EW-327)
3. *Gas Metal-Arc Welding Small Wire (Micro Wire)* (EW-328)
4. *Gas Metal-Arc Welding Plus Flux-Coated Wire (FabCO)* (EW-329)

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GAS SHIELDED METAL-ARC

Metal Transfer in Gas Shielded Metal-Arc Welding of Steel

Airco Welding Products, Union, N.J.
(8242-0138)...$75.00

16mm Colour/Silent Motion Picture. Time: 5 mins.

This is a high-speed film on a close-up of the arcs in M.I.G. welding. The various modes shown are: globular; spray; dip; and pulsed.

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GAS TUNGSTEN-ARC

Gas Tungsten-Arc Welding Process

Miller Electric Manufacturing Co., Appleton, Wis. (EICO Canada Ltd., Richmond Hill, Ont.)

(003320)	Purchase	$250.00
	Rental	$25/wk.

16mm/Super 8mm Colour/Sound Film

This film explains how to control each variable factor of the GTAW process to achieve welding objectives for all popular metals. High-speed photographic studies show the arc in proper and improper conditions. Detailed explanations of: AC, DCSP, and DCRP; the values of shielding gases; high-frequency; selection and benefits of tungsten electrodes; operator techniques and set-up; and DC component are presented.

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GAS TUNGSTEN-ARC

Gas Tungsten-Arc Welding (T.I.G.)

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-324)..$1.25

Wall Poster.

This wall poster measuring 35" x 28" is suitable for mounting.

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GASES AND SHIELDED ARC

Industrial Gases and Shielded Arc Welding

Airco Welding Products, Union, N.J.
(8242-0135)..$200.00

16mm Colour/Sound Motion Picture. Time· 27 mins.

The use of the various industrial gases used in industries in general is depicted. The film then illustrates where gases are used in the metalworking industry, specifically. Also shown are the HELIWELD (T.I.G.) process, the AIRCOMATIC (M.I.G.) process, and the CO_2 buried arc process.

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GAZ INERTE

Technique de soudure à gaz inerte

Moreland-Latchford Productions Ltd., Toronto, Ont. (Les Entreprises Internationales Tele-Film Ltée., Toronto, Ont.)
Vente...$210.00
Location..$35.00
Visionnement......................................$10.00

Film en couleur. Duré: 14 min.

Ce film explique la théorie de la soudure à gaz inerte, et il présente en détail le matériel employé et les fonctions des divers éléments aussi bien que leur alimentation. On montre aussi la façon de faire certaines soudures.

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GENERAL

Contemporary Welding Technology: Demonstrations and Career Perspectives

Prentice Hall Media, Tarrytown, N.Y. (Prentice-Hall of Canada, Ltd., Scarborough, Ont.)
(KD 979)..$250.00

Colour/Sound Motion Picture. 1978. Time: 15-20 mins.

Produced by a welding engineer, this film demonstrates the most advanced welding techniques. The welding processes described are: electron beam; laser; and ultrasonic welding. Filmed in actual welding shops, the narrative highlights the key features of each process as performed by technicians in clean room atmospheres. Electron beam illustrates two separate machines running production parts; laser shows laser welding of sheet metal and laser hole drilling of tool steel; and ultrasonic includes two machines in operation: one welding aluminum automotive hardware; the other, power transmission parts.

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GENERAL

Collection de radiographies de référence relatives aux soudures

Publications de la Soudure Autogène, Paris, France.

86 Fiches. 1952 et suppléments 1953, 1954 et 1966.

Les fiches donnent des renseignements concernant les repères, la nature et l'importance des défauts montrés, la position de soudage, l'épaisseur de la tôle et la préparation du joint, ainsi que les caractéristiques radiographiques. Le texte est en français sur un des côtés de la fiche et en anglais de l'autre côté. La collection est disponible sous deux formes différentes, à savoir:

1. avec un tirage sur papier collé sur la fiche. Ces fiches présentées dans une reliure sont plus économiques et moins fragiles que les films. On peut les consulter à la lumière du jour. Elles conviennent donc particulièrement au travail de chantier ou à l'enseignement;

2. avec un film transparent inséré dans un rectangle découpé dans la fiche. Cette présentation est destinée à l'usage courant dans les bureaux. Elle exige l'emploi d'un négatoscope.

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INERT GAS

Principles of Inert Gas Welding

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
(301/C6)..$25.00

Regular 8mm/Super 8mm Silent Film

This film illustrates the function of the inert gas screen in the weld zone, and shows the comparison with a conventional electric arc welding plant to illustrate the advantages of speed, heat concentration, and weld zone appearance afforded by the inert gas welding techniques.

Recommended Levels: Secondary, Further, and Industrial Education.

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INERT GAS SHIELDED TUNGSTEN-ARC

Nothing But the Best

Airco Welding Products, Union, N.J.
(8242-0139)..$200.00

16mm Colour/Sound Motion Picture. Time: 20 mins.

This is a story of Airco's inert gas shielded tungsten arc welding process - HELIWELD, its application in industrial production, and its stainless steel, aluminum, copper, and bronze assemblies.

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JOINING

Progress in Metal Joining

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

Purchase	$125.00
Loan - pay return postage only	Free

16mm Colour/Sound Film

This film shows how a "welding systems" approach provides the most efficient and economical way to join metals.

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JOINT EN "Y" SOUDE

Construction d'un joint en "Y" soudé

Moreland-Latchford Productions, Ltd., Toronto, Ont. (Les Entreprises Internationales Tele-Film Ltée., Montréal, P.Q.)

Vente	$210.00
Location	$35.00
Visionnement	$10.00

Film en couleur. Durée: 14 mins.

Le film présente tous les aspects de la construction de ce joint-la division en quatre, l'application du gabarit, le traçage sur le tuyau et le branchement, la coupe radiale, la coupe à onglet, le préchauffage, l'alignement, et la soudure finale.

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JOINTS

Making a Welded Lateral Joint

Moreland-Latchford Productions Ltd, Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)

(19-740)	$160.00

16mm Colour Film. Time: 14 mins.

Contents:

Quartering; Laying on template or marking pipe and branch; Mitre and radial cutting with oxy-acetylene torch; Pre-heating; Alignment; and Welding. (Also in French)

Recommended Levels: Senior, College, and Adult Education.

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MACRO

Macro Welding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (56 Frames). 1974. Time: 15 mins.

The welding techniques which are done with miniature equipment such as the Tescom oxy-acetylene welding rig are explained.

One colour/Sound filmstrip with double-sided phonodisc $28.00

One colour/sound filmstrip with audible signal cassette $30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second) $30.00

Recommended Levels: Secondary, College, and Adult Education.

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MACRO AND MICRO BONDING

Macro and Micro Bonding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730010)

Colour/Sound Filmstrip (66 Frames). Time: 18:05 mins.

This filmstrip delineates the basic metallurgical facts necessary to the understanding of micro and macro bonding and subsequently illustrates the operation of the equipment.

One colour/sound filmstrip with double-sided phonodisc

....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$30.00

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M.I.G.

Metal Inert Gas Techniques

Moreland-Latchford Productions Ltd., Toronto, Ont.
(International Tele-Film Enterprises Ltd., Toronto, Ont.)
(19-737)...$175.00

16mm Colour Film. Time: 14 mins.

This film explains the theory of M.I.G. welding. It shows the details of the equipment used and the functions of the various units, including power supplies. The operating procedures in the making of butt and fillet welds with various metals are fully demonstrated.

Recommended Levels: Senior, College, and Adult Education.

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M.I.G.

M.I.G. Welding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-734718)

Colour/Sound Filmstrip (72 Frames). Time: 14:54 mins.

This filmstrip shows how to safely set up and operate a M.I.G. unit. It also explains the jobs which may be handled satisfactorily with this process. The proper setup and safe operation of a specific M.I.G. welder is thoroughly discussed and illustrated.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second) $30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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M.I.G.

M.I.G. Welding

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
(301/C8)..$24.00

Regular 8mm/Super 8mm Silent Film

The dip-transfer method of M.I.G. welding is demonstrated. Attention is drawn to the limitations imposed upon fusion welded joints by the length of the filler rods used in a M.I.G. welding plant with reeled filler metal. The conclusion relates the weld characteristics to the most suitable filler rod.

Recommended Levels: Secondary, Further, and Industrial Education.

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M.I.G.

M.I.G. Welding Techniques

Moreland-Latchford Productions Ltd., Toronto, Ont. (Britannica Learning Materials, Toronto, Ont.)
(ML3920)..$16.50

Filmstrip/Cassette/Guide

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MICRO- AND MULTI-WIRE

Micro-Wire and Multi-Wire Welding

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-334)..$4.00

12-2" x 2" colour slides

The typical industrial applications of the micro-wire and multiwire semiautomatic continuous wire feed are shown.

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MICRO-WIRE

Micro-Wire Welding

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$185.00

16mm Colour/Sound Film. Time: 27 mins.

The micro-wire welding process and many automatic and semiautomatic industrial applications are shown.

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MICRO-WIRE

Micro-Wire Bonding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730012)

Colour/Sound Filmstrip (50 Frames). Time: 16:38 mins.

The step-by-procedure for micro-wire bonding with both a thermo compression and a hybrid ultrasonic wire bonder is explained and illustrated.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$30.00

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MINIATURIZED ELECTRONIC JOINING SERIES

Macro and Micro Bonding
Die Bonding

Micro-Wire Bonding

Thompson-Mitchell and Associates, Atlanta, Ga.
....$78.00/Set
....$28.00 Each

35mm Colour/Sound Filmstrips

The techniques of microelectronics are illustrated.

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PORTA-SLAG

Porta-Slag Slide Talk

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-397)..$3.95

12-2" x 2" Colour Slides with Script Narration

The porta-slag system is explained. The outstanding applications along with the actual porta-slag time comparisons as opposed to former welds are shown.

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RESISTANCE

Resistance Welding, Assembly

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730014)

Colour/Sound Filmstrip (78 Frames). Time: 21 mins.

Most of the spot welding techniques used in modern industry are explained and illustrated.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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RESISTANCE

Resistance Welding, Construction

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (68 Frames). 1974. Time: 18 mins.

This filmstrip is concerned with resistance welding in all phases directly connected with the heavy construction and assembly business.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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SHIELDED METAL-ARC

Shielded Metal-Arc Welding

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-271)..$1.00

Wall Poster.

This wall poster measuring 35" x 28" is suitable for mounting. It is available in either English or Spanish. Please specify.

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SHORT-CIRCUITING

Short-Circuiting Metal Transfer

Miller Electric Manufacturing Co., Appleton, Wis. (EICO Canada Ltd., Richmond Hill, Ont.)

(003317) Super 8mm - Purchase	$250.00
(003316) 16mm - Purchase	$250.00
Rental	$25/wk.

Colour/Sound Filmstrip.

This is an in-depth study of the short-circuiting process. High-speed photography shows right and wrong arc performance. Detailed instruction on how to set up and apply the process is given. The industry applications for all types of joints on both thin and thick gauge metals are shown. Remote control innovations offered by dual schedule, enabling more efficient production patterns, are featured in actual applications.

Contents:

Select electrode diameter; Set open circuit voltage; Set shielding gas flow; Set amperage (wire feed speed); Set slope of volt/ampere curve; and Check wire extension/contact tube.

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SPOT

Good as New...If Not Better

Miller Electric Manufacturing Co., Appleton, Wis. (EICO Canada Ltd., Richmond Hill, Ont.)

(003315) Super 8mm - Purchase	$150.00
(003314) 16mm - Purchase	$150.00
Rental	$12.50/wk.

Colour/Sound Filmstrip. Time: 15 mins.

This motion picture shows how to use short-circuiting and consumable spot welding in both light and heavier joint welding. Using auto body repair to demonstrate, the film details the advantages of these two welding methods. Patching, hole filling, build-up, and frame repair are some of the procedures presented. This film is suitable for trainers, auto body shops, and light gauge fabricators.

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SUBMERGED ARC

Submerged Arc Welding

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-325)..$1.25

Wall Poster.

This wall poster measuring 35" x 28" is suitable for mounting.

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T.I.G.

T.I.G. Welding

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
(301/C7)..$24.00

Regular 8mm/Super 8mm Silent Film

Both T.I.G. welding with filler metal and T.I.G. without filler metal are explored. Emphasis is on the correlation between electric current flow and weld zone temperature to conditions at which a tungsten rod can remain electrically and thermally stable.

Recommended Levels: Secondary, Further, and Industrial Education.

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T.I.G.

T.I.G. Welding

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730441)

Colour/Sound Filmstrip (75 Frames). Time: 16:38 mins.

The proper operation of tungsten-inert gas systems is illustrated. Also explained are the types of jobs best accomplished with this system.

One colour/sound filmstrip with double-sided phonodisc

....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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WELD DEFECTS

International Institute for Welding, London, England. (Canadian Welding Society, Weston, Ont.)

1. *Steel* (RRS)

   Eighty-six radiographs of the seven most common defects (mounted in a binder) are included.
   Film Negatives...$225.00
   Paper Prints...$125.00

2. *Aluminum* (RRA)

   Fifty-one films of the most common defects are identified as to material and process.
   Film Negatives...$150.00

3. *Radiographs of Welds* (RD)

   Radiographs of representative defects of welds in steels, plus a line drawing of the weldment illustrating the defects in each radiograph are given, 48 pp.
   ....$4.00

4. *Image Quality Indicators* (IQ)

   Each indicator contains seven precision wires of varying diameters that provide an accurate indication of resolution for radiographs.
   Seven wires from 0.10 to 0.40" diam............. $5.50
   Seven wires from 0.25 to 1.00" diam. $5.50
   Box of 12 (same size) $55.00

5. *Handbook of Radiographic Apparatus and Techniques* (HR)

   This handbook deals with the basic principles of radiography, sources of radiation, films and their processing, use of equipment, execution of radiographs, image quality indicators.

interpretation of radiographs, and the protection of personnel against x- and gamma-rays, 126 pp.
....$6.00

6. *Recommendations for Arc Welded Joints in Clad Steel Construction* (CS)

The types of joint to be used in almost every conceivable combination of geometries or plate are illustrated, 66 pp.
....$4.00

7. *Guide to the Welding and Weldability of C-Mn Steels and C-Mn Microalloyed Steels* (CMN)

The guide gives a theoretical background for the standardization of such steels for use in national and international specifications. The Appendices include compositions and properties of these steels made in ten foreign countries, 99 pp.
....$11.50

8. *Ultrasonic Testing in 11 Languages* (UTL)

Eleven alphabetical listings are given to translate precisely from one language to another the terminology of this specialized field, 102 pp.
....$4.00

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WELDING: SPECIAL APPLICATIONS SERIES

Introduction to Pipe and Tube Welding
Resistance Welding: Assembly
Resistance Welding: Construction and Capacitor Discharge

Thompson-Mitchell and Associates, Atlanta, Ga.
....$78.00/Set
....$26.00 Each

35mm Colour/Sound Filmstrip/Cassette Tape

The special types of welds developed for industry needs are shown.

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WELDING AND ALLIED PROCESSES

Welding and Allied Processes

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)

(A3.1-76) Wall Size (22" x 28")	$2.00
Desk Size (8-1/2" x 11")	$ .75

Master Chart. 1976.

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WELDING DATA

Welding Data

Taylor-Winfield Corp., Warren, Ohio. (F-H Welding Machines Ltd., Mississauga, Ont.)
(SP-13)

Charts.

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XII

ADVANCED WELDING
PACKAGED COURSES

SOUDAGE AVANCÉ
COURS

ALUMINUM WELDING

Aluminum Welding: Modern Techniques for Joining Nonferrous Metal

Canadian Welding Development Institute, Toronto, Ont.
....$40.00

21 Lessons/Tests/Final Exam/Diploma

This home-study course was designed to help students achieve a better understanding of the processes currently used; their advantages (and disadvantages) relative to each other; together with the knowledge of the procedures and applications. There are 21 easy-to-follow lessons illustrated with photographs, line drawings, tables and diagrams included in a 162-page volume.

Index and Synopsis of Table of Contents:

Lesson 1: Foreword and Introduction to Course

Lesson 2: Aluminum and its Alloys

Physical properties; Chemical properties; Weldability; Alloys of aluminum; Wrought alloy designation system; Casting alloy designation system

Lesson 3: Filler Alloys and Weldability

Alloys; Welding wire; M.I.G. electrode wire; Weldability; Hot shortness; Choice of Filler Alloy

Lesson 4: Supervision of Operations, Safety Precautions

Training of supervisory personnel; Extent of responsibility; Qualification of procedures; General safety precautions; Oxy-gas welding and brazing safety precautions; Arc welding safety precautions; Resistance welding safety precautions

Lesson 5: Pre-Weld and Post-Weld Operations

Types of joints; Edge preparation methods; Surface and joint cleaning; Joint spacing; Jigging; Pre-heat; Finishing

Lesson 6: Tungsten Inert Gas Arc Welding

Equipment; Theory of operation; Welding technique; Machine welding; Operating difficulties and their correction

Lesson 7: Metal Inert Gas Arc Welding

Characteristics of the metal inert gas welding process; Applications of the metal inert gas welding process; Operation of the metal inert gas welding process; Welding equipment; Installation of equipment; Welding materials; Welding procedures; Metal inert gas welding technique; Factors influencing weld quality; Common operating difficulties and their cause and correction

Lesson 8: M.I.G. Machine Welding

Advantages of M.I.G. machine welding; Applications of M.I.G. machine welding; Limitations of M.I.G. machine welding; Equipment for M.I.G. machine welding; Welding procedures; M.I.G. machine butt welds; M.I.G. machine fillet welds; Operating techniques; Quality control; Common defects, methods of location, their cause and correction

Lesson 9: Comparison of Inert Gas Shielded A/W Processes

Choice of process; Advantages of the metal inert gas welding process; Disadvantages of the M.I.G. process; Advantages of the tungsten inert gas welding process; Disadvantages of the T.I.G. process

Lesson 10: M.I.G. Spot Welding

Equipment; Thickness limitations; Safety; Quality control; Application; Conclusions

Lesson 11: Stud Welding

General; Equipment and procedure; Applications

Lesson 12: Arc Cutting

General considerations; Plasma arc cutting; M.I.G. cutting

Lesson 13: Oxy-acetylene Welding and Brazing

Part I - Oxy-acetylene Welding: equipment; Safety precautions; Preparation; Welding flame; Pre-heating; Welding Procedure. Part II - Oxy-acetylene brazing: Aluminum brazing alloys; Filler alloys; Fluxes; Joint types; Jigs; Preparation for brazing; Quen-Quenching; Finishing; Torch brazing; Furnace brazing; Dip brazing.

Lesson 14: Metal-Arc Welding

General considerations; Equipment; Safety precautions; Preparation; Welding procedure; Manipulation; Finishing

Lesson 15: Quality Control

General considerations; Standards and specifications; Inspection and testing of welded joints; Weld faults

Lesson 16: Welding Aluminum Pipe

General outline; End preparation; T.I.G. manual welding; M.I.G.

machine welding; Equipment; Field installation of aluminum pipe

Lesson 17: Allied Joining Processes

Riveting; Soldering; Adhesives; Pressure welding; Resistance welding; Bolt and screw fasteners; Electron beam welding; Plasma arc welding; Explosion welding; Laser beam welding; Friction welding; Diffusion bonding; Metallizing; Flame plating

Lesson 18: Corrosion Behaviour of Aluminum

General information; Factors that influence the corrosion rate; Importance of good design and careful construction; Galvanic corrosion; Crevice corrosion; Pitting corrosion; Relative corrosion resistance of aluminum alloys; Corrosion behaviour of welds in aluminum alloys; Painting aluminum; Conclusion; References

Lesson 19: Mechanical Properties of Aluminum Welds

General considerations; Typical mechanical properties; Shear properties; Fatigue properties

Lesson 20: Design Principles and Applications

General outline; Steps in design of welded fabrication; Welding factors affecting design; Welded joints; Static strength of joints; Determination of doubler dimensions; Fatigue strength of joints; Cost of welding; Control of distortion; Practical joint design in aluminum

Lesson 21: Fusion Welding Terms and Welding Symbols

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FLUX-CORED ARC "PAT" WELDING TRAINING COURSE

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(012.0)	Complete Course	$550.00
(012.40)	Instructor's Guide	$40.00
(012.41)	1 Written Test (50 Copies Each)	$12.00
(012.42)	"PAT" Examination Kit	$80.00
(EW-269)	Student Workbook	$3.00
(EW-385)	Hobart Welding Guide	$3.50

Complete Course: Super 8 Continuous Loop Training Film Cartridges/Cassette Tape Recorded Commentary/Instructor's Guide/Written Test/Student Workbook/Hobart Welding Guide

See "Welding, Cutting and Brazing "PAT" Welding Training Course" in the Oxy-acetylene Package Course Section for a description of the course components.

Topics:

1. *Lecture/Discussion, Introduction to Flux-Cored Arc Welding*
2. *Lecture/Discussion, The Safety and Health of Welders*
....$120.00

3. *Stringer Bead, Flat Position (Machine Adjustment)*
....$40.00

4. *Fillet Weld, Lap Joint, Flat Position*
5. *Fillet Weld, Lap Joint, Horizontal Position*
....$60.00

6. *Lecture/Discussion, Machine Set-Up, Operation, and Adjustment*
7. *Stringer Bead, Flat Position (Machine Adjustment)*
....$65.00

8. *Fillet Weld Lap Joint, Flat Position Self-Shielded Wire*
9. *Fillet Weld Lap Joint, Horizontal Position, Self-Shielded Wire*
....$50.00

10. *Lecture/Discussion, Joint Preparation and Weld Quality*
11. *Single Vee Groove Weld, Butt Joint, Flat Position*
....$75.00

12. *Single Bevel Groove Weld, Butt Joint, Horizontal Position*
13. *Single Bevel Groove Weld, Butt Joint, Horizontal Position, Cut and Etch Test*
....$55.00

14. *Fillet Weld, Tee Joint, Vertical Position, Up*
....$40.00

15. *Single Vee Groove Weld, Butt Joint, Vertical Position, Up*
16. *Single Vee Groove Weld, Butt Joint, Vertical Position, Up, Guided Bend Test*
....$45.00

17. *Fillet Weld, Tee Joint, Overhead Position*
....$40.00

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GAS METAL-ARC

Gas Metal-Arc Welding Course

Westinghouse Electric Corp., Sykesville, Md. (Liquid Carbonic

Ltd., Montreal, P.Q.)

(180082)	Purchase of Standard Format	$297.00
	Purchase of Special Format for Optisonic Viewers	$540.00
	Purchase of Special Format for Audiscan Viewers	$440.00
	Rental	$90.00
	Preview	$35.00
	Student Workbooks (Set of 3 including pre- and post-tests)	$17.50
	Instructor's Guide	$10.00
	Audio-Scriptbook	$15.00

Standard Format: 35mm Colour Filmstrip, Standard Audiotape Deck (for use with Singer/Graflex and Dukane cassette type viewers). Audio visual equipment not included.

Special Format: Suitable for Optisonic Viewers (not included). 35mm Filmstrips and Tapes in Single Cartridge and Audiscan Viewers (not included). 16mm Filmstrips and Tapes in Single Cartridge.

Complete Course: Selected Audio Visual Format/1 Set of Student Workbooks/Instruction Guides/Audio-Scriptbook/Pre- and Post-tests.

A six-step learning system is provided to assure individualized instruction for every student/trainee. These steps are (1) pre-tests; (2) basic safety rules instruction; (3) terminology and theory through programmed instruction books; (4) welding techniques through synchronized audio visual commpak cartridge instruction; (5) hands-on practice; and (6) post-tests. This course is suitable for students with seventh to eighth grade education and is self-paced. The instructors may also use the cartridge programs as the basis for their group lessons. The students complete this program in about 40 hours. It contains information about gas metal-arc welding and welding equipment. The types of welds, terminology, and techniques are discussed. After the students have been familiarized with the equipment and know the safety rules, they are then introduced to the gas metal-arc procedure. As they go along in the course, they will make the necessary sample welds.

Lessons:

1. Introduction to Gas Metal-Arc Welding
2. Running Beads
3. Learning to Weld: 1/4" T-joints with 1/4" fillets; 3/32" T-joints with 1/8" fillets; T-joints with 1/2" fillets; square butt joints; flat position V-groove butt joints; and horizontal position V-groove joints.

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GAS METAL ARC (M.I.G.) WELDING

Advanced Systems, Inc., Elk Grove Village, Ill.
(2310) Complete Course (12 Video Tapes) $6600.00
....$555.00/Each

Time: 12-24 Hrs.

This course has a learner-paced, modular approach to the correct techniques and procedures for semi-automatic, gas-shielded electric arc welding. It explains and illustrates the correct techniques and procedures for M.I.G. welding. The torch movements for each of the welding positions and joint types are clearly demonstrated.

Video Tapes:

1. *Setting Up for Welding* (2310V01)

   This unit shows how the spray arc and short arc work. The student learns how to set up the equipment and adjust the shielding gas, welding wire, welding current, and the torch in preparation for welding. Time: 1-2 hrs.

2. *Flat and Horizontal Welding* (2310V02)

   This unit demonstrates how to strike the arc and carry a weld puddle. The student also learns how to make the horizontal and flat fillet weld, the flat butt weld, and the horizontal prepared butt weld. Time: 1-2 hrs.

3. *Vertical and Overhead Welding* (2310V03)

   Here, the student learns the techniques for making vertical fillet and prepared butt welds. The unit also covers overhead fillet welds. Time: 1-2 hrs.

4. *Oxy-acetylene Welding and Cutting: Braze Welding* (2310V04)

   This unit demonstrates the correct techniques for braze welding of sheet steel, plate and castings. The student learns how to prepare the equipment, how to adjust oxygen and acetylene pressures, how to light the welding torch, and properly adjust the flame for braze welding. Time: 1-2 hrs.

5. *Fusion Welding* (2310V05)

   Through animation and demonstration, the student learns the proper torch, rod movement and weld puddle control techniques for multi-pass fusion welding of heavy steel plate. The student also learns the correct procedures for adjusting and operating the equipment for fusion welding. Time: 1-2 Hrs.

6. *Fusion Welding of Light Gauge Steel* (2310V06)

The do's and don'ts of fusion welding thin sheet steel are demonstrated through close-up action shots and animation. This unit also demonstrates the common faults in welding thin sheet metal, with the emphasis on the correct torch and rod manipulation. Time: 1-2 hrs.

7. *Flame Cutting* (2310V07)

This unit teaches the proper techniques for cutting steel and iron. Step-bh-step instructions for making straight line cuts, irregular shapes, beveling plate edges and circle cutting are covered. The student also learns how to start a cut at the end of a plate, how to start-in from the edge by piercing a hole in the plate and how to restrat a lost cut. Time: 1-2 hrs.

8. *Flame Grooving* (2310V08)

Here, the student studies the correct procedures for finishing castings, preparing plate and casting for welding, cutting-out old welds and gouging-out surface defects and other unwanted metal. Time: 1-2 hrs.

9. *Hard Facing* (2310V09)

This unit demonstrates the correct techniques for applying hard-facing alloy to the surface of steel parts. Flame adjustments and pre-heating of the part to be hard-faced are illustrated and demonstrated. The student also learns the correct technique for hard-facing thin-edged parts without damaging the edge. Time: 1-2 hrs.

10. *Heliarc (T.I.G.) Welding* (2310V010)

This unit is an introduction to the Heliarc (T.I.G.) welding process. The student is introduced to the T.I.G. torch by an animated diagram that shows how the welding current, shielding gas and cooling water flow through the torch. This unit also covers the preparation of the torch and electrode; checking the gas, water and electrical connections; and setting welding current and shielding gas pressure. Time: 1-2 hrs.

11. *Heliarc Welding of Carbon Steel Pipes* (2310V011)

Here, the simplicity of the Heliarc process for welding pipe is demonstrated. The student learns how the T.I.G. torch operates and also learns about joining of heavy-walled, large-diameter pipe in the flat, vertical and overhead positions.

12. *The Air Acetylene Flame* (2310V012)

This unit demonstrates the basic techniques and a few of the many applications for the air-acetylene torch flame. The student learns the proper preparation of metals to be joined or repaired by soldering. The techniques for soldering sheet metal, copper tubing and electrical cables are described and demonstrated. Use of the air-acetylene flame for paint removal on wood or metal surfaces is also demonstrated. Time: 1-2 hrs.

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GAS METAL ARC-BASIC AND ADVANCED "PAT" WELDING TRAINING COURSES

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(010.0)	Complete Course (Basic)	$660.00
(011.0)	Complete Course (Advanced)	$550.00
(010.40)	Instructor's Guide (Basic)	$40.00
(011.40)	Instructor's Guide (Advanced)	$40.00
(010.41)	2 Written Tests (50 Copies Each) (Basic)	$10.00
(011.41)	1 Written Test (50 Copies Each) (Advanced)	$12.00
(010.42)	"PAT" Examination Kit (Basic)	$80.00
(011.42)	"PAT" Examination Kit (Advanced)	$80.00
(EW-269)	Student Workbook (Basic)	$3.00
(EW-269)	Student Workbook (Advanced)	$3.00
(EW-385)	Hobart Welding Guide	$3.50

Complete Course: Super 8 Continuous Loop Training Film Cartridges/ Cassette Tape Recorded Commentary/Instructor's Guide/Written Test(s) Test(s)/Student Workbook/Hobart Welding Guide

See "Welding, Cutting and Brazing "PAT" Welding Training Course" in the Oxy-acetylene Package Course Section for a description of the course components.

Basic Course:

Topics:

1. *Lecture/Discussion, GMAW Introduction*
   ....$55.00

2. *Lecture/Discussion, Glossary of Welding Terms*
   Lecture/Discussion, Safety and Health of Welders
   ....$75.00

3. *Lecture/Discussion, Preparation for Welding*
4. *Surface Weld-Flat Position*
   ....$65.00

5. *Lecture/Discussion, Adjustment of Equipment*
....$55.00

6. *Square Groove and Fillet Weld-Butt, Lap, Tee Joints-Flat Position*
7. *Square Groove and Fillet Weld-Butt, Lap, Tee Joints-Horizontal*
....$75.00

8. *Lecture/Discussion, Quality Butt and Fillet Welds*
....$55.00

9. *Square Groove and Fillet Welds-Butt, Lap, Tee Joints-Vertical Position, Down*
10. *Square Groove and Fillet Weld-Butt, Lap, Tee Joints-Vertical Position, Up*
....$55.00

11. *Lecture/Discussion, Metal Transfer and Shielding Gas*
....$50.00

12. *Square Groove and Fillet Weld-Butt, Lap, Tee Joints-Overhead Position*
....$55.00

13. *Single Vee Groove Weld-Butt Joint-Horizontal Position*
14. *Single Vee Groove Weld-Butt Joint-Guided Bend Test*
15. *Single Vee Groove Weld-Butt Joint-Vertical Position, Down*
16. *Single Vee Groove Weld-Butt Joint-Guided Bend Test*
....$75.00

17. *Lecture/Discussion, Flux-Cored Arc Welding and Submerged Arc Welding*
....$55.00

18. *Single Vee Groove Weld-Butt Joint-Flat Position*
19. *Single Vee Groove Weld-Butt Joint-Overhead Position*
....$55.00

20. *Fillet Weld, Lap and Tee Joints, Horizontal Position*
21. *Fillet Weld, Lap and Tee Joints, Vertical Position Down*
....$55.00

Advanced Course;

Topics:

1. *Introduction to Advanced Gas Metal Arc Welding*
2. *Glossary of Welding Terms, Safety and Health of Welders*
....$115.00

3. *Stringer Bead, Flat Position (Machine Adjustment)*
4. *Fillet Weld, Lap and Tee Joint, Horizontal Position*
....$85.00

5. *Fillet Weld, Lap and Tee Joints, Vertical Position, Up*
6. *Weldability of Aluminum Alloys*

....$85.00

7. *Fillet Weld, Tee Joint, Overhead Position*
8. *Fillet Weld, Outside Corner and Tee Joint, Flat Position*

....$95.00

9. *Shielding Gases for Gas Metal Arc Welding*
10. *Single Vee Groove Weld, Butt Joint, Flat Position (with backing)*

....$105.00

11. *Fillet Weld, Outside Corner and Tee Joint, Vertical Position, Up*
12. *Fillet Weld, Tee Joint, Vertical Position, Up (Visual and Etch Test)*

....$85.00

13. *Gas Metal Arc Welding of Other Nonferrous metals than Aluminum*
14. *Fillet Weld, Tee Joint, Overhead Position*

....$85.00

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GAS TUNGSTEN ARC "PAT" WELDING TRAINING COURSE

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(020.0)	Complete Course	$660.00
(020.40)	Instructor's Guide	$35.00
(020.41)	2 Written Tests (50 Copies Each)	$10.00
(020.42)	"PAT" Examination Kit	$80.00
(EW-269)	Student Workbook	$3.00
(EW-385)	Hobart Welding Guide	$3.50

Complete Course: Super 8 Continuous Loop Training Film Cartridges/ Cassette Tape Recorded Commentary/Instructor's Guide/Written Test Test(s)/Student Workbook/Hobart Welding Guide

See "Welding, Cutting and Brazing "PAT" Welding Training Course" in the Oxy-acetylene Package Course Section for a description of the course components.

Topics:

1. *Lecture/Discussion, Introduction to Gas Tungsten Arc Welding*
2. *Lecture/Discussion, The Safety and Health of Welders*

....$85.00

3. *Lecture/Discussion, Preparation for Welding, Start Up, Equip-*

ment Adjustment, Shut Down

4. Stringer Bead-Flat Position without and with Filler Metal-Mild Steel

....$65.00

5. Fillet Weld-Lap Joint-Horizontal and Vertical Position Up-without and with Filler Metal-Mild Steel
6. Lecture/Discussion, Weld Properties and Weld Quality-Mild Steel

....$80.00

7. Fillet Weld-Corner Joint-Flat Position-without and with Fi Filler Metal-Mild Steel
8. Fillet Weld-Tee Joint-Horizontal and Vertical Position Up-with Filler Metal-Mild Steel

....$65.00

9. Square Groove Weld-Butt Joint-Flat Position-with Filler Meta Metal-Mild Steel
10. Square Groove Weld-Guided Bend Test
11. Square Groove Weld-Butt Joint-Overhead Position, with Filler Metal-Mild Steel

....$80.00

12. Lecture/Discussion, Introduction to GTAW using Pulsed Current Current
13. Square Groove Weld-Butt Joint-Flat Position-with Filler Metal-without and with Pulsation-Stainless Steel

....$45.00

14. Fillet Weld-Lap Joint-Horizontal Position-without and with Filler Metal-Stainless Steel
15. Lecture/Discussion, Weld Properties and Weld Qualities-Stainless Steel

....$55.00

16. Fillet Weld-Corner Joint-Flat Position-without and with filler Metal-Stainless Steel
17. Square Groove Weld-Butt Joint-Flat Position, Fillet Weld-Corner Joint-Flat Position, Fillet Weld-Lap Joint-Horizontal Position-Visual Test

....$40.00

18. Fillet Weld-Tee Joint-Horizontal and Vertical Position Up-with Filler Metal-Stainless Steel
19. Stringer Bead-Flat Position-with Filler Metal-Aluminum

....$60.00

20. Lecture/Discussion, Arc Characteristics and Effects of Equipment Adjustments

....$40.00

21. *Square Groove Weld-Butt Joint-Flat Position-with Filler Metal Aluminum*
22. *Lecture/Discussion, Weld Properties and Weld Quality-Aluminum*
....$50.00

23. *Fillet Weld-Lap Joint-Horizontal Position-with Filler Metal-Aluminum*
24. *Fillet Weld-Corner Joint-Flat Position with Filler Metal-Aluminum*
....

25. *Fillet Weld-Tee Joint-Horizontal and Vertical Position Up-with Filler Metal-Aluminum*
26. *Square Groove Weld-Butt Joint-Flat Position, Fillet Weld-Corner Joint-Flat Position, Fillet Weld-Lap and Tee Joint-Horizontal Position-Visual Test*
....$40.00

27. *Square Groove Weld-Butt Joint-Vertical Position Up-with Filler Metal-Aluminum*
28. *Square Groove Weld-Butt Joint-Overhead Position-with Filler Metal-Aluminum*

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GAS TUNGSTEN ARC

Gas Tungsten Arc Welding Course (GTAW/T.I.G.)

Westinghouse Electric Corp., Sykesville, Md. (Liquid Carbonic Ltd., Montreal, P.Q.)

(180112)	Purchase of Standard Format	$175.00
	Purchase of Special Format for Optisonic Viewers	$365.00
	Purchase of Special Format for Audiscan Viewers	$265.00
	Rental	$60.00
	Preview	$25.00
	Student Workbook (includes pre- and post-tests)	$7.50
	Instructor's Guide	$10.00
	Audio-Scriptbook	$10.00

Standard Format: 35mm Colour Filmstrip, Standard Audiotape Deck (for use with Singer/Graflex and Dukane cassette-type viewers). Audio visual equipment not included.

Special Format: Suitable for Optisonic Viewers (not included). 35mm Filmstrips and Tapes in Single Cartridge and Audiscan Viewers (not included). 16mm Filmstrips and Tapes in Single Cartridge

Complete Course: Selected Audio Visual Format/1 Set of Student

Workbooks/Instruction Guides/Audio Scriptbook/Pre- and Post-tests

A six-step learning system is provided to assure individualized instruction for every student. These steps are (1) pre-tests; (2) basic safety rules instruction; (3) terminology and theory through programmed instruction books; (4) welding techniques through synchronized audio visual commpak cartridge instruction; (5) hands-on practice; and (6) post-tests. This course is suitable for students with seventh to eighth grade education is self-paced. The instructors may also use the cartridge programs as the basis for their group lessons. The students complete this program in about 25 hours. It presupposes a basic knowledge of welding terms and skill in electrode manipulation. The course design assumes that the student has already completed a previous course in either electric arc or oxy-acetylene welding.

Lessons:

1. Introduction to Gas Tungsten Arc Welding
2. The GTAW System
3. Power Supply Switches and Current controls
4. Inert Gas Supply
5. The GTAW Torch
6. The Tungsten Electrode
7. Learning to Weld: Starting an arc; running a bead; welding square butt joints; welding lap joints; and welding T-joints.

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GENERAL

Welding Course

National Laboratory for the Advancement of Education, Washington, D.C.

Complete Course	$379.70
(1) Black and White Video Tape	$130.00
(2) Black and White Video Tape	$90.00
(1) Colour Video Tape, No Sound	$90.00
Instructor Print Materials, 212 pp	$21.20
Student Print Materials, 485 pp	$48.50

Special Package: 1 Set of Instructor Print Materials
20 Sets of Student Print Materials
2 Video Tapes Containing 3 Motion Pictures
1 Video Tape, No Sound containing 6 Motion Pictures............................$1040.96

Complete Course: Video Tapes/Instructor Print Materials/Student Print Materials (texts, workbooks, and programmed units). All motion pictures have been transferred to video tape and are available in either 3/4" cassette or 1/2" reel-to-reel formats. 1978.

Black and White Video Tapes:

1. *Metals Identification-A; Metals Identification-B* (1)

   Time: 35 mins.

2. *Heat Treating* (2)

   Time: 14 mins.

Colour Video Tapes, No Sound:

1. *Adjusting Gas Pressure with Torch Valves Closed; Adjusting Gas Pressure with Torch Valves Open; Weld Beads Using Filler Rod; Lines of Fusion - Beads without Filler Rod; Fillet Weld; Corner Joint* (1)

Contents:

Heat treating; Hardness testing; Cleaning and electroplating; Introduction to oxy-acetylene welding; Oxy-acetylene welding; Cutting; Soldering; Brazing and surface treatment; Introduction to metallic arc welding; Special metallic arc and resistance welding applications; Inert gas shielded welding of high performance aircraft metals; and Pipe, tubing and aircraft exhaust and jet engine hot section repair.

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HOT AIR WELDING

Educational Plastics - Hot Air Welding

Howard W. Sams & Co., Inc., Indianapolis, Ind. (Lenbrook Industries Industries Ltd., Scarborough, Ont.)
(25122)..$53.20

Tape Cassette/35mm Slides/Cassette Tape Script/Instructor's Manual/ Book-Type Binder Container

The slides illustrate the school and industrial applications of the process and an accompanying cassette tape script is coordinated with the slides, having a running time of 12 to 25 minutes. The Instructor's Manual contains all of the necessary information for the processing area, plus lesson objectives, experiments and projects, study questions, safety precautions, references and a bibliography, a script of the cassette-tape presentation, a summary, and a glossary of terms.

Contents:

Hot air welding of thermoplastics; Filler rods; Air or gas supply; Techniques in welding; and Typical junior high school applications.

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PROCESSES

Current Welding Processes

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)

Purchase of Complete Course	$105.00
Rental	$35.00
Text, 144 pp	$11.00
Instructor's Manual	$3.00

Text/Instructor's Manual/159 Slides

This course covers the basics of the seven most widely-used welding processes: oxyfuel gas welding and cutting; shielded metal-arc; gas tungsten arc; gas metal arc; submerged arc; plasma arc; and electroslag/electrogas welding.

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PROFILES IN AIRCOMATIC

Airco Welding Products, Union, N.J.

	$35.00/Each
(8242-0005) Hand Out Material	$ .60/Each

Slide/Tape Cassette Programs

1. *Part IV: Spray Arc* (8242-0148)

   Time: 20 mins.

2. *Part V: Spray Arc* (8242-0149)

   Time: 17 mins.

3. *Part VIII: Pulsed Arc* (8142-0152)

   Time: 21 mins.

Parts IV and V cover the AIRCOMATIC Spray Arc. The fundamentals, theory and welding techniques are clearly explained. Part VIII tells the Pulsed Arc story, what it is and how it fits into the

AIRCOMATIC Process. The recommended hand-out material, the AIRCOMATIC Slide Guide-ADC 1185 contains the welding parameters for spray transfer welding of aluminum, steel and stainless steel and dip transfer welding of steel and stainless steel.

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SHIELDED METAL-ARC-BASIC AND ADVANCED "PAT" WELDING TRAINING COURSE

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(001.0)	Complete Course (Basic)	$600.00
(002.0)	Complete Course (Advanced)	$660.00
(001.40)	Instructor's Guide (Basic)	$40.00
(002.40)	Instructor's Guide (Advanced)	$40.00
(001.41)	5 Written Tests (50 Copies Each) (Basic)	$20.00
(002.41)	4 Written Tests (50 Copies Each) (Advanced)	$17.50
(001.42)	"PAT" Examination Kit (Basic)	$80.00
(002.42)	"PAT" Examination Kit (Advanced)	$80.00
(EW-269)	Student Workbook (Basic)	$3.00
(EW-269)	Student Workbook (Advanced)	$3.00
(EW-385)	Hobart Welding Guide (for Basic and Advanced)	$3.50

Complete Course: Super 8 Continuous Loop Training Film Cartridges/ Cassette Tape Recorded Commentary/Instructor's Guide/Written Tests/ Student Workbook/Hobart Welding Guide

See "Welding, Cutting and Brazing "PAT" Welding Training Course" in the Oxy-acetylene Package Course Section for a description of the course components.

Basic Course:

Topics:

1. *Lecture/Discussion, Arc Welding Introduction*
2. *Lecture/Discussion, Safety and Health of Welders*

....$105.00

3. *Strike Arc and Run Bead, Surface Weld, Flat Position*
4. *Pad of Beads, Surface Weld, Flat Position*

....$55.00

5. *Fillet Weld, Lap Joint, Horizontal Position*
6. *Pad of Beads, Surface Weld, Flat Position*

....$35.00

7. *Lecture/Discussion, Visual Inspection and Practical Weld Tests*

....$35.00

8. *Fillet Weld. Tee Joint, Horizontal Position*

9. Fillet Weld, Tee Joint, Flat Position
....$40.00

10. Pad of Beads, Surface Weld, Horizontal Position
11. Square Groove Weld, Butt Joint, Horizontal Position
....$40.00

12. Lecture/Discussion, Electrode Selection
....$50.00

13. Fillet Weld, Lap Joint, Vertical Position Up
14. Fillet Weld, Tee Joint, Vertical Position Up
....$35.00

15. Fillet Weld, Tee Joint, Vertical Position Up
16. Square Groove, Butt Joint, Vertical Position Up
....$50.00

17. Lecture/Discussion, Power Sources for Welding
....$35.00

18. Fillet Weld, Lap Joint, Overhead Position
19. Fillet Weld, Tee Joint, Overhead Position
....$35.00

20. Fillet Weld, Tee Joint, Overhead Position
21. Square Groove Weld, Butt Joint, Overhead Position
....$35.00

22. Lecture/Discussion, Welding Distortion Control
....$80.00

23. Fillet Weld, Lap and Tee Joints, Flat and Vertical Positions Down
24. Pad of Beads, Surface Weld, Flat, Horizontal and Vertical Pos Positions Down
....$40.00

25. Fillet and Square Groove Weld Lap-Butt and Corner Joints-Flat-Horizontal and Vertical Positions
26. Fillet Weld, Lap Joint, Vertical Positions Down
....$40.00

27. Square Groove Weld, Butt Joint, Flat Position
28. Fillet Weld, Lap Joint, Horizontal Position
....$35.00

29. Lecture/Discussion, The Low Hydrogen Electrode and Its use
....$35.00

30. Fillet Weld, Tee Joint, Vertical Position Up
31. Fillet Weld, Tee Joint, Overhead Position

....$40.00

Advanced Course:

Topics:

1. *Lecture/Discussion, Introduction*
2. *Lecture/Discussion, Safety and Health of Welders*

....$90.00

3. *Fillet Weld, Lap Joint, Horizontal Position*

....$60.00

4. *Lecture/Discussion, Air Arc Cutting and Gouging*
5. *Fillet Weld Lap Joint-Overhead Position*

....$70.00

6. *Lecture/Discussion, Procedure and Welder Qualification*
7. *Fillet Weld, Lap Joint, Vertical Position, Up Hill Travel*

....$80.00

8. *Lecture/Discussion, Destructive Testing*
9. *Fillet Weld Lap Joint Cross Section Etch Test*

....$45.00

10. *Lecture/Discussion, Nondestructive Testing*
11. *Single Vee Groove Weld, Butt Joint, Horizontal Position*

....$90.00

12. *Single Vee Groove Weld, Butt Joint, Overhead Position*
13. *Single Vee Groove Weld, Butt Joint, Overhead Position Guided Bend Test*

....$35.00

14. *Lecture/Discussion, Metals Identification for Welding*

....$45.00

15. *Single Vee Groove Weld, Butt Joint, Vertical Position*
16. *Single Vee Groove Weld, Butt Joint, Vertical Position, Guided Bend Test*

....$40.00

17. *Lecture/Discussion, Welding of Cast Iron and Surfacing of Steel*

....$60.00

18. *Single Vee Groove Weld, Butt Joint Flat Position*

....$35.00

19. *Fillet Weld, Lap Joint, All Positions*

....$60.00

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SHIELDED METAL ARC (STICK ELECTRODE) WELDING

Welding Equipment and Safety
Striking an Arc and Running a Bead
Weaving the Electrode
Oxy-acetylene Equipment and Safety
Oxy-acetylene Flame Cutting
Fillet Weld Techniques
Fillet Welds with E-7024 Electrodes
Flat Position Vee Butt Joints
Flat Position Open Root Butt Joints
Horizontal Position Weld Beads
Horizontal Vee Butt Joints
Vertical Welding Techniques
Vertical Vee Butt Joints
Overhead Welding Techniques
American Welding Society Bend Test

Miller Electric Manufacturing Co., Appleton, Wis. (Liquid Carbonic Ltd., Montreal, P.Q.)

(003307 MMM SMAW S)	Complete Course with Films	$1850.00
(003308 MMM SMAW)	Complete Course with Video Tapes	$1850.00
(003309 MMM SMAW)	Student Text Set	$19.50
(003310 MMM SMAW)	Instructor Package	$18.75

Complete Course: 15 Films or Videotapes/Student Text Set/Instructor Package

This programmed learning package contains a lecture series of an actual welding demonstration and shop instructions for all phases of shielded metal arc welding instruction. The student texts supplement the film series, with reading material relative to each procedure of the process. The Instructor's Package contains an instructor's guide which details the system completely, and the necessary administrative materials.

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SUBMERGED ARC

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(018.0)	Complete Course	$550.00
(018.40)	Instructor's Guide	$40.00
(018.41)	1 Written Test (50 Copies Each)	$12.00
(018.42)	"PAT" Examination Kit	$80.00
(EW-269)	Student Workbook	$3.00
(EW-385)	Hobart Welding Guide	$3.50

Complete Course: Super 8 Continuous Loop Training Film Cartridges/Cassette Tape Recorded Commentary/Instructor's Guide/

Written Test/Student Workbook/Hobart Welding Guide

See "Welding, Cutting and Brazing "PAT" Welding Training Course" in the Oxy-acetylene Package Course Section for a description of the course components.

Topics:

1. *Lecture/Discussion, Introduction to Submerged Arc Welding*
2. *Lecture/Discussion, Safety and Health of Welders*
3. *Lecture/Discussion, Submerged Arc Joint Design and Procedures*
4. *Lecture/Discussion, Equipment Set-Up, Operation and Shut-Down*
5. *Lecture/Discussion, The Effect of Primary and Secondary Welding Variables on Quality*
6. *Lecture/Discussion, Submerged Arc Fluxes and Electrode Wire*
7. *Fillet Weld, Tee Joint, Flat Position*
8. *Square Groove Weld Butt Joint, Flat Position*
9. *Submerged Arc Welding Applications*
10. *Multiple Wire Submerged Arc Welding Systems*
11. *Single Vee Groove Weld, Butt Joint, Flat Position*
12. *Fillet Weld, Tee Joint, Horizontal Position*

The above topics are planned and subject to change.

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TUNGSTEN INERT GAS (T.I.G.)

Tungsten Inert Gas (T.I.G.)

E.I. Du Pont de Nemours & Co. (Inc.), Wilmington, Del. (Du Pont of Canada Ltd., Montreal, P.Q.)
(122)..$23.85

Instruction Time: 13 Hrs.

This self-study course was designed for students with little or no background in specific areas of learning. It consists of a predetermined amount of subject matter which has been broken into small bits of information. These bits are incorporated into frames on a course plan. The student reads the frame, answers a specific question, then compares the correct answer with his own before proceeding.

Contents:

The operation of a tungsten inert gas welding torch; Detailed description of the steps to be taken to prepare a T.I.G. torch: set the power supply unit, set the inert gas flow, put on protective equipment, strike and hold a T.I.G. arc, form a weld puddle and move it a short distance and then shut down the equipment.

Practical exercises are included for each section of the course.

Prerequisite: Some familiarity with oxy-acetylene and metal-arc welding terms and principles and the ability to understand simple drawings and diagrams.

* * * *

WELDING AND JOINING

Welding and Joining Processes

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)

Purchase of Complete Course	$105.00
Rental	$35.00
Text, 146 pp	$11.00
Instructor's Manual	$2.50

Text/Instructor's Manual/136 Slides

This course covers the basics of the **12 less common** commercial welding and joining processes, including cold welding, electron beam welding, and ultrasonic welding.

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WELDING INSTRUCTIONAL FILM SERIES

Educational Progress Co. Ltd., Burlington, Ont.

(270-9230-0B) Complete Series	$620.00
(270-9230-0B) Instruction Manual	$5.00

Complete Series: 28 Silent, Super 8mm Film Loops in either Technicolor or Kodak Cartridges/Instructional Manual

An individual guide is printed on each film box. Critical on-the-job functions are isolated into 28 lessons and shown in a step-by-step approach on 28 separate cartridges. The films are especially suitable for individualized, group instruction, and/or makeup work. The silent caption format provides opportunities for teacher comment, class discussions, or using the loops in a test situation. The Instruction Manual supplies material for complete lesson plans for each loop and includes: objectives; synopses; vocabulary lists; pre- and post-screen activities; diagrams which can be used for copies or transparencies; and review questions for use as a test.

The Oxy-acetylene Process

1. *Preparation of Equipment* (270-8230-02)
2. *Setting the Regulators/Adjusting and Defining the Oxy-acetylene Flames* (270-8230-03)
3. *Oxy-acetylene Hand Cutting* (270-8230-04)
4. *Brazing Broken Cast Iron Handle* (270-8230-05)
5. *Silver Brazing Stainless Steel* (270-8230-06)
6. *Aluminum Brazing* (270-8230-07)
7. *Pipe Welding* (270-8230-08)
8. *Welding 10 Gauge Sheet: Outside Corner Joint in Flat Position* (270-8230-09)
9. *Welding 10 Gauge Sheet: Outside Corner Joint in Vertical Position* (270-8230-10)

(270-8230-01) Set..$220.50

Shielded Metal Arc Welding (Stick Process)

1. *Preparation of Equipment* (270-8230-12)
2. *Electrode Manipulation* (270-8230-13)
3. *Welding 3/8" Plate: Flat Position* (270-8230-14)
4. *Welding 3/8" Plate: Vertical Position* (270-8230-15)
5. *Welding a T-Joint* (270-8230-16)
6. *Welding 1/8" Plate* (270-8230-17)

(270-8230-11) Set..$147.00

Tungsten Inert Gas Welding (T.I.G.)

1. *Preparation of Equipment* (270-8230-19)
2. *Running a Bead* (270-8230-20)
3. *Welding an Outside Corner Joint* (270-8230-21)
4. *Welding a T-Joint* (270-8230-22)
5. *Welding a Square Butt Joint* (270-8230-23)
6. *Welding Aluminum* (270-8230-24)

(270-8230-18) Set..$147.00

Metal Inert Gas Welding (M.I.G.)

1. *Preparation of Equipment* (270-8230-26)
2. *Welding in the Flat Position* (270-8230-27)
3. *Welding in the Vertical Position* (270-8230-28)
4. *Welding with Flux-Cored Electrode* (270-8230-29)
5. *Welding Aluminum* (270-8230-30)

(270-8230-25) Set..$122.50

Testing and Inspecting Welds

1. *Destructive Testing* (270-8230-32)
2. *Nondestructive Testing* (270-8230-33)

(270-8230-31) Set...$49.00

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XIII

PIPE WELDING
PRINT MATERIALS

SOUDAGE DE CONDUITES
MATÉRIEL IMPRIMÉ

Assemblages Soudés Recommandés pour Tuyauteries

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 49 pp.

Ce document a pour objet de servir de recommandation concernant les assemblages pour tuyauteries en aciers au carbone et faiblement alliés et exécutés par les procédés de soudage manuels à l'arc et oxyacétylénique. Il ne contient pas de recommandations sur le traitement thermique et ne concerne pas non plus les canalisations à longue distance. Son but est d'illustrer, par des exemples, des modèles opératoires valables et couramment reconnus.

* * * *

Bordereau de Tuyautage

Berthet, P. 75880 Paris, CEDEX 18: Publications de la Soudure Autogène, 20 pp.

Cet ouvrage a été établi dans le but de fournir les données nécessaires à l'établissement des devis estimatifs pour les travaux de tuyauterie industrielle basse pression. Il indique les temps et les consommations de matières premières relevés expérimentalement pour l'exécution d'assemblages soudés au chalumeau et à l'arc avec électrodes enrobées pour la confection des assemblages courants sur tubes en acier doux de diamètres échelonnés entre 12-17 et 207-253 mm. En outre, des mesures ont été faites pour les opérations préparatoires d'oxycoupage des tubes.

* * * *

Canalisations D'oxygène et D'acétylène pour Distribution dans les Ateliers

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1972, 33 pp.

Bilingue français/anglais.

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Cutting Pipe (W2500)
Beveling Pipe (W2501)
How to Cut Pipe to Form 90-Degree Elbow (W2502)
How to Cut Pipe to Form 90-Degree Joint (W2503)

How to Cut and Form a Tee Joint (W2504)
Roll Weld - Butt Joint - Vee Groove (W2520)
Fixed Position - Butt Joint - Vee Groove (W2521)
Tee Joint - Flat Position - Multipass (W2522)
Roll Weld Pipe - Continuous Beads - Flat Position (W3530)
Roll Weld Pipe - Butt Joint - Square Groove (W3531)
Roll Weld Pipe - Butt Joint - Vee Groove (W3532)
Fixed Position - Pipe Weld - Butt Joint - Vee Groove (W3533)
Tee Joint - Stringer Beads - Flat Position (W3534)

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author, 1974. ....$ .38 each

Each learning module, which is designed for student use, contains a purpose, objectives, learning opportunities, an information summary, and a self- and post-test.

Recommended Levels: Secondary and Post-secondary Education

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Gas and Oil Pipeline Welding Practices

Barkow, A.G. New York, N.Y.: Welding Research Council, April 1962.
(Bulletin No. 76)..$2.00

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Gas Tungsten Arc Pipe and Tube Welding

Hobart School of Welding Technology. Troy, Ohio: Author, 1976, 48pp
(EW-269)

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Gas Tungsten Arc Welding of Titanium Piping and Tubing

American Welding Society. Miami, Fla.: Author, 1973, 14 pp.
(Canadian Welding Society, Weston, Ont.)
(D10.6-73)...$3.85

* * * *

How to Do High-Quality Short Arc Welding of Pipe

Linde Division, Union Carbide Corp. Long Island City, N.Y.: Author, 1976, 32 pp. Softcover. (Union Carbide Canada Ltd., Toronto, Ont.)
(791F19)..$1.80

The techniques and procedures outlined in this booklet are designed to aid the pipe fabricator and welder to produce code quality joints. The booklet opens with a general discussion of the codes involved and defines the welding positions as classified in pipe-welding specifications. The types of equipment required are considered and recommended characteristics are noted for power supply, the wire feeder, and the torch. The composition and mechanical properties of the welding wires are listed in tabular form and the advantages of the different types of wires are given. The various shielding gases and gas mixtures used in short arc welding are discussed. Instructions are provided for the initial edge preparation, fit-up, and tacking to assure a high-quality joint. Detailed attention is given to the welding techniques in the text and to the illustrations, including root pass, film pass, and cover pass welding in various positions. An easy-to-follow trouble-shooting guide lists the faults or defects which may be encountered in using the short arc process together with their causes and the corrective action to be taken to prevent poor quality welds. The procedures for welding various schedules of pipe in fixed, rolled, vertical, and inclined positions are spelled out in detail, including the joint design, wire classification and size, wire feed speed and welding current, shielding gas, preheat and postheat requirements, etc.

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Interpretation of Radiographs of Pipeline Welding Defects

Barkow, A.G. Chicago, Ill.: Natural Gas Pipeline Co. of America, 48 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW415)..$2.50

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Local Heat Treatment of Welds in Piping and Tubing

Canadian Welding Society. Weston, Ont.: Author, 1975, 32 pp.
(D10.10-75)..$3.85

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Micro-Wire Pipe Welding

Hobart School of Welding Technology. Troy, Ohio: Author, 1972, 31pp. (EW-269)

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Pipe Fitter's and Pipe Welder's Handbook

Frankland, T. Troy, Ohio: Hobart School of Welding Technology, 1969, 194 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.) (EW234)..$6.20

This pocket-size reference manual assists the student and tradesman by reviewing the basic trade mathematics, providing pipe fitting calculations, illustrating a variety of layouts, and then providing a number of useful reference tables.

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Pipe Fitter's Handbook

Lindsey, F.R. Troy, Ohio: Hobart School of Welding Technology, 1967, 464 pp. 3rd edition. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW389)..$15.40

This handbook provides the answers to everyday problems involving pipe bending and fabricating, whether in the shop or in the field. This enlarged, revised edition is a reference book for pipe fitters, steam fitters, layout men, contractors, plumbers, apprentices, and anyone else concerned with the layout and installation of pipe. The material is grouped into five distinct sections according to job descriptions. The new topics in this edition include: Extensions of the setback and length of bends tables to a radius of 20'; Minutes of arc table for length of bend; Layouts for offset and double offset bends; Circle bends; 480-degree expansion U-bends; Two-piece welded turns; Eccentric and concentric reducers; Branch and eye connections; Torch cut welding elbows; Over-flow funnel template and pipe caps; and many others. Another new feature is the addition of a reference data section containing information and data on 24 subjects most useful to the man-on-the-job.

Contents:

Part 1: Power and industrial pipe bending - setback and length of bends; Offset bends; Double offset and crossover bends; Circular bends; Expansion bends; 90-degree turns; Bending pipe around a circle; Wrinkle bends; Minimum bending radius. Part 2: Pipe fabrications - mitering pipe; Welded turns; Mitered coils; Mitered brackets; Templates for mitering; Branch connections; Torch cut welding elbows; Elbows, tees and crosses; 22½-degree eccentric reducer; Valves with butt welding ends; Concentric reducer; Pipe caps; Pipe hanger U-bolts; Spacing of hangers. Part 3: Soldering and brazing; Plastic pipe - soldering and brazing; Solder joint fittings; Plastic pipe; Dimensions and pressure limits; Support spacing for PVC pipe; Characteristics of pipe plastics; Relative physical properties. Part 4: Offset connections; Screwed and flanged fittings - common offset connections; Travel and run; Rolling offset; Two-pipe turn, equal spread; Screwed pipe coils; Threading pipe; Standard threads; Fitting dimensions; Clearance for turning; Laying lengths; Overflow funnel template; Drilling flanges; Flange fitting dimensions; Valve laying lengths; Flanges and gaskets. Part 5: Reference data - spark tests for metals; Sheet metal weights; Weights and melting points of metals; Temperature of saturated seam; Valve types; Water in pipes; Copper tube dimensions; Dimensions of steel and wrought iron pipe; Identification of piping systems; Pipe expansion; Tank capacities; Angles on the steel square; Angles on the 6' rule; Trigonometric functions; Right angle formulas; Solving trigonometry problems; Circumferences and areas of circles; Weights and measures; Reciprocals of numbers; Decimal equivalents of fractions; Conversion tables; Areas and volumes; Square and square roots; Pipe fitters dictionary; and Index.

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Pipe Trades Pocket Manual

Frankland, T. Troy, Ohio: Hobart School of Welding Technology, 1969, 262 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.) (EW390)..$15.40

This working notebook contains the complete calculation tables for pipe bends, piping offsets, miter-turn fittings, welding elbow offsets, and fabricating odd-angle offsets. It also explains how to solve angles with a steel square and with a watch. Mathematical and other reference tables are also included.

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Pipe Welding Procedures

Rampaul, H. Troy, Ohio: Hobart School of Welding Technology, 1973, 327 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.) (EW436)..$18.75

This book was written from the viewpoint of the welder. The author describes in detail the manipulative procedures that are used to weld successful pipe joints. While this book deals primarily with the procedures used to weld both thick-wall and thin-wall pipe by the shielded metal-arc process (SMAW), an entire chapter deals with root bead welding by the gas tungsten-arc process (GTAW). Other subjects are included to reinforce the welder's understanding of the procedures that are used in pipe welding. These include: essentials of welding, metallurgy, distortion, pipe welding defects, qualification of the welding procedure and the welder, and welding safety. There is also a chapter on fitting-up pipe. This well-illustrated book includes 181 diagrams, drawings, and half-tones.

Contents:

Introduction; Essentials of shielded metal-arc welding technology; Heat input and distribution; Preparation of the pipe joint; Uphill welding the root bead on heavy wall pipe; Welding the root bead by the gas tungsten-arc welding process; The intermediate and cover passes; Welding thin wall pipe; Horizontal pipe welding; Welding other pipe joints; Introduction to welding metallurgy; Distortion in pipe welding; Pipe welding defects; Fitting-up pipe; Qualification of the welding procedure and the welder; and General welding safety.

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Pipe Welding Techniques

Griffin, I.H., Roden, E.M., & Briggs, C.W. Troy, Ohio: Hobart School of Welding Technology, Jan. 1978, 110 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$6.25

This text reflects the current pipe welding standards and procedures. Each unit focuses on a particular phase of pipe welding with step-by-step explanations for the completion of all welds. Many new photos and line drawings illustrate the modern pipe welding techniques. Unit-end review questions and a comprehensive final review are provided in the text for student evaluation.

Contents:

Applications of welded pipe; Running horizontal beads on vertical plate; Making horizontal weave beads on vertical plate; Standards and tests for pipe welding; Procedure aids for qualifying tests; Horizontal welds on beveled plates; Three-pass vertical fillet welds on vertical plates; Vertical-up welds on beveled plate; Vertical-down welds on beveled plate; Overhead welds on plate; Rolling butt welds on horizontal pipe; Fixed-position welds on

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horizontal pipe: vertical-up method; Fixed-position welds on horizontal pipe: vertical-down method; Fixed-position welds on vertical pipe; Fixed-position welds on 45-degree inclined pipe; Pipe fitting; 90-degree branch connections; Lateral pipe connections; Comprehensive review; Answers to review questions; Answers to comprehensive review; References; Acknowledgements; and Index.

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Procedures for Pipe Welding

Sosnin, H.A. Lake Zurich, Ill.: Monticello Books, 52 pp. $7.25

The requirements of the various piping codes are outlined in this book and about 20 procedures covering gas and arc welding of steel piping are included. MIG and TIG welding of aluminum and the procedures for welding in different positions, on a variety of pipe sizes are also covered.

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Recommended Practices for Gas Shielded-Arc Welding of Aluminum and Aluminum Alloy Pipe

American Welding Society. Miami, Fla.: Author, 1960, 25 pp.
(Canadian Welding Society, Weston, Ont.)
(D10.7-60)..$3.85

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Shielded Metal-Arc Pipe (Downhill) Welding

Hobart School of Welding Technology. Troy, Ohio: Author, 1978.
(EW-269)

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Shielded Metal-Arc Pipe (Uphill) Welding

Hobart School of Welding Technology. Troy, Ohio: Author, 1978, 81pp.
(EW-269)

The above two workbooks take the student step-by-step through the individual welding course.

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Standard for Qualification of Welding Procedures and Welders for Piping and Tubing

Canadian Welding Society. Weston, Ont.: Author, 1969, 72 pp.
(D10.9-69)..$6.60

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The Theory and Technical of Soldering and Brazing of Piping Systems

Sosnin, H.A. Lake Zurich, Ill.: Monticello Books, 1971, 71 pp.
Paperback.
....$4.00

The how-to of producing good pipe joints is explained step-by-step, through the mastering of six basic operations. This well-illustrated book also includes an appendix containing photo-charts of the most common pipe fittings, and a number of charts related to plumbing/piping systems.

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Universal Pipe Fitter's Layout Guide

Matasovic, J. Troy, Ohio: Hobart School of Welding Technology, 72 pp.
(EW265)..$5.00

This pocket-size booklet suitable for the pipe welder, contains tables, charts, and diagrams of the layout and cutting of pipe.

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The Welding of 347 Stainless Steel Piping and Tubing

Linnert, G.E. New York, N.Y.: Welding Research Council, Oct. 1958.
(Bulletin No. 43)..$1.00

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Welding of Austenitic Chromium-Nickel Steel Piping and Tubing

Canadian Welding Society. Weston, Ont.: Author, 1966, 38 pp.
(D10.4-66)..$3.85

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Welding of Chromium-Molybdenum Steel Piping

Canadian Welding Society. Weston, Ont.: Author, 1961, 12 pp.
(D10.8-61)..$3.85

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Welding of Line Pipe Steels

Welding Research Council. New York, N.Y.: Author, Mar. 1977.
Monograph.
....$18.00

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Welding Pressure Pipelines and Piping Systems

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, April 1977, 27 pp.
(Bulletin No. M640).....................................$ .17

Contents:

Vertical down vs. vertical up; Cross-country pipeline, vertical-down welding techniques, special techniques for X60-X70 pipe, vertical-down procedures, procedure and operator qualifications, double ending, API pipe steel; Pipe welding electrodes; Thin-wall pipe welding procedures; In-plant pipe, vertical-up welding techniques, qualification of welders, vertical-up procedures, and ASTM pipe steels.

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XIV

PIPE WELDING
NON-PRINT MATERIALS

SOUDAGE DE CONDUITES
MATÉRIEL NON IMPRIMÉ

BASIC PRINCIPLES

Basic Pipe Welding: Oxy-Acetylene

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730013)

Colour/Sound Filmstrip (54 Frames). Time: 11 mins.

This filmstrip explains the necessary torch and filler rod manipulations which must be practiced to weld successful joints in the horizontal fixed position (5G) and the vertical fixed position (2G).

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

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HELIARC WELDING

Heliarc Welding of Carbon Steel Pipes

Audio Brandon Films, Mount Vernon, N.Y. (Marlin Motion Pictures, Ltd., Mississauga, Ont.) $155.00

16mm Film. Time: 10 mins. 1973.

Using demonstration and animation, this film shows both the basic technique and the wide number of applications for that technique.

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LATERAL JOINTS

Making a Welded Lateral Joint - Steamfitting

Moreland-Latchford Productions Ltd., Toronto, Ont.
(International Tele-Film Enterprises, Toronto, Ont.)
(19-740)....................$175.00

Colour Film. Time: 14 mins.

This film explains quartering, laying on a template, or marking the pipe and branch, mitre and radial cutting with an oxy-acetylene torch, pre-heating, alignment and welding. (Also available in French).

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LATERAL JOINTS

Moreland-Latchford Productions, Ltd., Toronto, Ont. (Britannica Learning Materials, Toronto, Ont.)
(ML3919)...$16.50

Filmstrip with Cassette and Guide

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MICRO-WIRE WELDING

Micro-Wire Pipe Welding

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$18.00

16mm Colour/Sound Film. Time: 18 mins.

This film introduces the micro-wire welding process and explains the techniques and advantages of the process.

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MIG WELDING

MIG Pipe Welding - Part I

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (54 Frames). Time: 16 mins.

This filmstrip explains the use of gas metal-arc welding as applied to pipe joints using carbon dioxide shielding gas and either micro-wire or flux-cored electrode wire. The welds are shown for the 5G horizontal-fixed position.

* * * *

The previous two filmstrips are available in the following formats:

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

Recommended Levels: Secondary-College, Adult, and Vocational Education

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MIG WELDING

MIG Pipe Welding - Part II

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)

Colour/Sound Filmstrip (60 Frames). Time: 18 mins.

The techniques for welding pipe in the 2G vertical-fixed position, the 1G rolled position and the techniques for welding poorly fitted root joints are contained in this filmstrip. This material can be used separately or as a continuation of *MIG Pipe Welding - Part I.*

PLASTIC PIPE

Joining Plastic Pipe

Marshall Maintenance, Trenton, N.J. (Electrolab Ltd., Belleville, Ont.)

(31)	Purchase	$370.00
	Rental	$70/wk.

16mm Colour Film. Time: 19 mins.

The importance of the primer and the correct solvent cement used in joining PVC and CPVC plastic pipe of various sizes is emphasized in this film. The technique of back welding the correction of minor leaks and threading procedures is also shown.

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SAFETY AND TECHNIQUES

Pipe Welding Safety and Techniques

Lincoln Electric Co., Cleveland, Ohio. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(ED-89)..$3.00/set

These eight 17½" x 22" wall charts, printed in blue on a white background, emphasize safety, joint preparation, lineup and tacking, electrode angle and the keyhole requirements for vertical-up and downhill welding. These charts also show API and ASME test procedures. The Lincoln Electrode Selection Guide chart is also included. The charts may be tinted with coloured pencils or crayons for greater impact.

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SHIELDED METAL-ARC

Shielded Metal-Arc Pipe Welding: Downhill

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-732198)

Colour/Sound Filmstrip (64 Frames). Time: 12 mins.

This filmstrip thoroughly explains how to weld pipe downhill in the horizontal-fixed position with sufficient ability to practice for employment in industry. The preparation and welding of poorly fitted joints, such as hi-lo offset, overspaced root gap and underspaced root gap are also illustrated.

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SHIELDED METAL-ARC

Shielded Metal-Arc Pipe Welding: Uphill

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730015)

Colour/Sound Filmstrip (63 Frames). Time: 12 mins.

The techniques of welding joints in the horizontal-fixed position (5G) and the vertical fixed position (2G) are presented with step-by-step instructions sufficient for the student to become adept in welding joints in both positions.

The previous two filmstrips are available in the following formats:

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$30.00

Recommended Levels: Secondary, College, Adult, and Vocational Education

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SHIPBOARD STEAM SYSTEMS

Piping Fabrication for Shipboard High Temperature Steam Systems--Welding

U.S. Navy, Washington, D.C. (National Audio-Visual Center, Washington, D.C.)
(007514/JJ)..$43.00

16mm Black and White Film. Time: 13 mins. 1958.

The care and skills required in the welding phases of working with chrome-molybdenum piping are emphasized.

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TECHNIQUES

Pipe Welding Techniques

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
(19-738)..$175.00

Colour/Sound Film. Time: 13 mins.

This film shows in detail, the preparation of joints for arc welding, and the proper use of the body in making a weld. Demonstrations of all the aspects of downhill and uphill welding and roll and vertical welding are included. Examples of pipe welding in industry and checking with x-rays are given. (Also available in French).

Recommended Levels: Senior, Adult

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TECHNIQUES

Pipe Welding Techniques

Moreland-Latchford Productions Ltd., Toronto, Ont. (Britannica Learning Materials, Toronto, Ont.)
(ML3921)..$16.50

Filmstrip with Cassette and Guide.

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TECHNIQUES

Soudure de tuyauterie

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
....$210.00

Film sonore et en couleur. Durée: 18 minutes.

Le film présente en détail la préparation des joints pour une soudure à l'arc électrique et donne la bonne position du corps durant le travail. Les démonstrations présentent la soudure montante et descendante, présentent la soudure cylindrique et la soudure verticale. On donne des exemples industriels de la soudure du tuyaux et de la vérification de la soudure à l'aide de rayons X.

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XV

PIPE WELDING
PACKAGED COURSES

SOUDAGE DE CONDUITES
COURS

SHIELDED METAL ARC "PAT" PIPE UPHILL AND DOWNHILL WELDING TRAINING COURSE

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)

(003.0)	Complete Course (Uphill)	$660.00
(004.0)	Complete Course (Downhill)	$550.00
(003.40)	Instructor's Guide (Uphill)	$40.00
(004.40)	Instructor's Guide (Downhill)	$40.00
(003.41)	3 Written Tests (50 Copies Each) (Uphill)	$15.00
(004.41)	2 Written Tests (50 Copies Each) (Downhill)	$12.00
(003.42)	"PAT" Examination Kit (Uphill)	$80.00
(004.42)	"PAT" Examination Kit (Downhill)	$80.00
(EW-269)	Student Workbook (Uphill)and Downhill)	$3.00
(EW-269)	Student Workbook (Downhill)	$3.00
(EW-385)	Hobart Welding Guide	$3.50
(EW-385)	Hobart Welding Guide	$3.50

Complete Course: Super 8 Continuous Loop Training Film Cartridges/Cassette Tape Recorded Commentary/Instructor's Guide/Written Tests/Student Workbook/Hobart Welding Guide

See "Welding, Cutting and Brazing "PAT" Welding Training Course" in the Oxy-acetylene Package Course Section for a description of the course components.

Uphill Course:

Topics:

1. *Lecture/Discussion, Introduction to Uphill Pipe Welding*
2. *Lecture/Discussion, The Safety and Health of Welders*

....$105.00

3. *Prerequisite Skill Test, Single Vee Groove Weld Butt Joint, Vertical and Overhead Position*
4. *Lecture/Discussion, How to Read and Apply Pipe Welding Procedures*

....$100.00

5. *Preparation and Assembly of a Pipe Joint*
6. *Lecture/Discussion, Weld Quality-Reading-The Puddle*

....$75.00

7. *Single Vee Groove Weld, Butt Joint, Horizontal Fixed Position (5G)*
8. *Single Vee Groove Weld, Butt Joint, Horizontal Fixed Position (5G)*
   Visual Inspection

....$70.00

9. *Single Vee Groove Weld, Butt Joint, Vertical Fixed Position*

(2G)

10. Single Vee Groove Weld, Butt Joint, Vertical Fixed Position
(2G)
Visual Inspection
....$60.00

11. Lecture/Discussion, Pre-heat and Interpass
....$55.00

12. Single Vee Groove Weld, Butt Joint, 45° Fixed Position (6G)
13. Single Vee Groove Weld, Butt Joint 45° Fixed Position (6G), Guided Bend Test
....$70.00

14. Lecture/Discussion, Methods of Applying the Root Pass
....$60.00

15. Single Vee Groove Weld, Butt Joint, 45° Fixed Position (6G), Stainless Steel Pipe
16. Single Vee Groove Weld, Butt Joint, 45° Fixed Position (6G), Stainless Steel Pipe, Guided Bend Test
....$60.00

17. Preparation and Assembly of a Pipe Joint, with Backing Ring
....$35.00

18. Single Vee Groove Weld, Butt Joint, 45° Fixed Position (6G), with Backing Ring
19. Single Vee Groove Weld, Butt Joint, 45° Fixed Position (6G), with Backing Ring, Guided Bend Test
....$60.00

Downhill Course:

Topics:

1. Lecture/Discussion, Introduction to Downhill Pipe Welding
2. Lecture/Discussion, The Safety and Health of Welders
....$80.00

3. Prerequisite Skill Test, Single Vee Groove Weld, Butt Joint, Vertical and Overhead Positions
....$70.00

4. Lecture/Discussion, How to Read and Apply Downhill Pipe Welding Procedures
....$70.00

5. Preparation and Assembly of a Pipe Workpiece
6. Lecture/Discussion, Weld Quality-Reading the Puddle Downhill Travel
....$100.00

7. *Single Vee Groove Weld, Butt Joint, Horizontal Fixed Position (5G), Downhill Travel*
8. *Single Vee Groove Weld, Butt Joint, Horizontal Fixed Position (5G), Visual Inspection Test*
   ....$85.00

9. *Lecture/Discussion, Pipeline Construction*
   ....$70.00

10. *Single Groove Vee Weld, Butt Joint, 45° Fixed Position (6G), Downhill Travel*
11. *Single Vee Groove Weld, Butt Joint, 45° Fixed Position (6G), Guided Bend Test*
    ....$115.00

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XVI

TOOLS AND EQUIPMENT
PRINT MATERIALS

OUTILS ET ÉQUIPEMENTS
MATÉRIEL IMPRIMÉ

An Approach to Process Selection - Submerged Arc, Fully Mechanized, Innershield , Semi-Mechanized, and Stick Electrode

Lincoln Electric Co. Cleveland, Ohio: Author, Apr. 1971, 4 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(G120)..Free

* * * *

Designer's Guide for Welded Construction

Lincoln Electric Co. Cleveland, Ohio: Author, Oct. 1975, 4 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(D110)..Free

Contents:

About weld joints; American Welding Society's standard welding symbols; Typical weldmetal, and basemetal properties; and Electrode conformances and properties.

* * * *

Fast-Fill Electrodes - High Deposit Rates--High Iron Powder for Welding Mild and Alloy Steels

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 1 page, French on reverse side.
(M210-C2D)...Free

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Fast-Freeze Lincoln Electrodes for Mild Steel

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 1 page, French on reverse side.
(M210-C2E)...Free

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Fill-Freeze Electrodes for General Purpose and Sheet Metal Welding on Mild Steel

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 1 page, French on reverse side.
(M210-C2D)...Free

Fixtures and Manipulators for Mechanized Arc Welding

Payne, S. Cleveland, Ohio: Lincoln Electric Co., Jan. 1971, 12 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.) (G130)..Free

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Fixtures, Positioners and Manipulators

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 5 pp.
....Free

This article was reprinted from the *Canadian Welder and Fabricator* magazine.

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Fluxes, Solders and Welding Alloys

Martin, L.F. Park Ridge, N.J.: Noyes Data Corp., 1973.
....$36.00

Over 170 different, patent-based processes relating to solders, brazing and welding alloys and suitable fluxes are described.

Partial Contents:

Organic fluxes for solders; Inorganic fluxes for solders; Brazing; Submerged arc welding; and Other welding processes.

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Hand Tools for Metalworking Trades

Sutton, M. Austin, Tex.: Instructional Materials Center, Division of Extension, University of Texas at Austin, 1972, 130 pp. 3rd edition.
....$7.00

This manual was written as a reference book for both the instructor and the student involved in basic metalworking operations. Designed to provide background information and skill in the use of basic tools, the manual describes the proper manner of designating types, sizes, and makes of tools, explains how to care for tools, how they should be stored, and the safety considerations involved in their use. The manual also describes and illustrates the standards of design and construction for various hand tools and specifies what limitations should be imposed during their use. The hand tools discussed include: hacksaws; files; hammers; chisels and punches; vises and clamps; measuring and layout tools; wrenches; screwdrivers; drills; threading tools; reamers; soldering tools; and gauges.

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How to Conserve Arc Welding Materials

Blodgett, O.W. Cleveland, Ohio: Lincoln Electric Co., 1975.
(G610.1)...Free

This article was reprinted from the April 1975 issue of the *Metal Progress* magazine.

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Low Hydrogen Electrodes with Iron Powder for Mild and Alloy Steels

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 1 page, French on reverse side.
(M210-C2B)...Free

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Millermatic - A Complete Line of Wire Dispensing Units

Miller Electric Manufacturing Co. Appleton, Wis.: Author.
(EICO Canada Ltd., Weston, Ont.)
.............-...Free

This booklet describes and illustrates guns, torches and suggested power sources for use with wire control/feeders for all types of gas metal-arc (MIG) welding.

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Operating Instructions for Lincwelder ® AC-225-S

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, Feb. 1977, 4 pp. English and French.
(IM-237-C-1)...Free

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Painting Over Welds

Lincoln Electric Co. Cleveland, Ohio: Author, Jan. 1971, 1 p. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.) (G490)..Free

Contents:

Problems; Causes; Relative effect of different electrodes and processes; Cures; and Summary.

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Planning Aids for Arc Welding Instruction

Lincoln Electric Co. Cleveland, Ohio: Author, June 1976, 12 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.) (ED-63)..Free

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Positioneering

Aronson, C.N. Lake Zurich, Ill.: Monticello Books, 1969, 347 pp. (Canadian Welding Society, Weston, Ont.) $24.20

This book gives a background on weldment positioners for those who either intend to build or buy a unit. The basics on design and engineering philosophy, the special types available, and the considerations based on weldment size, weight and center of gravity have all been covered by a pioneer in the field.

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Semiautomatic Welder Outmaneuvers Conventional Stick Electrodes

Lincoln Electric Co. Cleveland, Ohio: Author, 2 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.) (S115)..Free

This is a section of an article entitled *Long Stickout Welding--A Practical Way to Increase Deposition Rates* reprinted from the *Welding Journal*. The section also gives the recommendations and attachments for Linc-Fill equipment.

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Specification for Aluminum and Aluminum-Alloy Arc Welding Electrodes, 1969, 13 pp.
(A5.3-69)..$3.85

Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes, 1969, 25 pp.
(A5.10-69)...$3.85

Specification for Bare Carbon Steel Electrodes and Fluxes, Submerged Arc-Welding, 1976, 22 pp.
(A5.17-76)...$5.50

Specification for Bare Low-Alloy Steel Electrodes and Fluxes for Submerged Arc-Welding, 1976, 32 pp.
(A5.23-76)...$5.50
New incl. add..$1.76

Specification for Composite Surfacing Welding Rods and Electrodes, 1970, 32 pp.
(A5.21-70)...$3.85

Specification for Consumables Used for Electrogas Welding of Carbon and High Strength Low-Alloy Steels, 1978, 20 pp.
(A5.26-78)...$5.50

Specification for Consumables Used for Electroslag Welding of Carbon and High Strength Low Alloy Steels, 1978, 20 pp.
(A5.25-78)...$5.50

Specification for Copper and Copper-Alloy Arc-Welding Electrodes, 1976, 18 pp.
(A5.6-76)..$5.50

Specification for Copper and Copper-Alloy Welding Rods and Electrodes, 1977, 21 pp.
(A5.7-77)..$5.50

Specification for Corrosion-Resisting Chromium and Chromium-Nickel Steel Covered Welding Electrodes, 1969, 22 pp.
(A5.4-69)..$3.85
(A5.4-Add. 1-75) 1975 Addenda to A5.4-69)..................$1.10
Addenda is free with purchase of A5.4-69.

Specification for Corrosion-Resisting Chromium and Chromium-Nickel Steel Welding Rods and Bare Electrodes, 1976, 17 pp.
(A5.9-76)..$5.50

Specification for Flux-Cored Corrosion-Resisting Chromium and Chromium-Nickel Steel Electrodes, 1974, 29 pp.
(A5.22-74)...$3.85

Specification for Iron and Steel Gas-Welding Rods, 1969, 13 pp.
(A5.2-69)..$3.85

Specification for Low-Alloy Steel Covered Arc-Welding Electrodes, 1969, 13 pp.
(A5.5-69)..$3.85
(A5.5-Add. 1-77) 1977 Addenda to A5.5-69.................$1.00
Addenda is free with purchase of A5.5-69

Specification for Magnesium-Alloy Welding Rods and Bare Electrodes, 1969, 21 pp.
(A5.19-69)...$3.85

Specification for Metal Cutting Machine Tool Weldments, 1971, 42 pp.
(D14.2-71) (Including 1975 Revisions).....................$5.50

Specification for Mild Steel Covered Arc-Welding Electrodes, 1969, 41 pp.
(A5.1-69)..$3.85

Specification for Mild Steel Electrodes for Gas Metal-Arc Welding, 1969, 22 pp.
(A5.18-69)...$3.85

Specification for Nickel and Nickel-Alloy Bare Welding Rods and Electrodes, 1976, 10 pp.
(A5.14-76)...$5.50

Specification for Nickel and Nickel-Alloy Covered Welding Electrodes, 1976, 23 pp.
(A5.11-76)...$5.50

Specification for Surfacing Welding Rods and Electrodes, 1970, 39 pp.
(A5.13-70)...$3.85

Specification for Titanium and Titanium-Alloy Bare Welding Rods and Electrodes, 1970, 29 pp.
(A5.16-70)...$3.85

Specification for Tungsten Arc-Welding Electrodes, 1969, 9 pp.
(A5.12-69)...$3.85

Specification for Welding Rods and Covered Electrodes for Welding Cast Iron, 1969, 29 pp.
(A5.15-69)...$3.85

Specification for Zirconium and Zirconium-Alloy Bare Welding Rods and Electrodes, 1976, 8 pp.
(A5.24-76)...$5.50

Each of the previous specifications are available from the Canadian Welding Society, Weston, Ont. They include the chemical, mechanical and packaging requirements (U.S.) plus a useful guide to the filler metals classified.

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Storing and Redrying Manual Electrodes

Lincoln Electric Co. Cleveland, Ohio: Author, Jan. 1976, 2 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(M629)..Free

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Storing and Redrying Submerged Arc Welding Fluxes

Lincoln Electric Co. Cleveland, Ohio: Author, Nov. 1975, 1 p.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(S621)..Free

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Welder - Test Preparation Book

Mafex Associates, Inc. Johnstown, Penna.: Author. (Niagara Publishers, Fenwick, Ont.)
(7V-AJ0051)...$11.00

This test preparation book helps students prepare for the job they are training for. It gives sample questions and problems encountered on actual tests. Also contained in this book is information about the welder's job as well as sections on welding materials, welding design, joining of various materials, surfacing, and metalizing.

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Welder's Guide

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 1977, 14 pp.
(IM-237-C)..Free

Contents:

Safety precautions; Learning to weld - basic welding instructions for the non-professional beginner welder; Using the carbon arc torch; AC-225-S operating manual which includes safety, installation and operating instructions and the parts list; Selecting electrodes - brief descriptions of the types and operating data for all Lincoln electrodes; and Lincoln arc welders - brief descriptions of welders of most interest to non-professional welders.

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Welding Accessories

Hobart School of Welding Technology. Troy, Ohio: Author, 25 pp.
(Hobart Bros. Canada Ltd., Woodstock, Ont.)
....Free
.....

This catalogue gives a description of the Hobart complete line of protective clothing, safety equipment, electrode holders, and other welding needs.

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Welding Electrodes

Hobart School of Welding Technology. Troy, Ohio: Author.
(Hobart Bros. Canada Ltd., Woodstock, Ont.)
....Free

The descriptions and specifications of Hobart's full line of arc welding electrodes, automatic wires, and fluxes are given.

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Welding Machine Instruction Books and Parts Manuals

Hobart School of Welding Technology. Troy, Ohio: Author.
(Hobart Bros. Canada Ltd., Woodstock, Ont.)
....Average Price $2.00

The instruction book or the parts manual for any Hobart welding machine is available. Send the serial number and the model number of the particular machine for which you desire the book or manual. You may write for specific prices or order to be invoiced later.

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Welding Machines

Hobart School of Welding Technology. Troy, Ohio: Author.

(Hobart Bros. Canada Ltd., Woodstock, Ont.)
....Free

This catalogue gives the descriptions and specifications of all Hobart manufactured welding machines.

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Welding Power Sources

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 1973, 24 pp. (EICO Canada Ltd., Weston, Ont.)
....$ .50

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Weldirectory of Cast Iron, Aluminum and Bronze Arc Welding Electrodes

Lincoln Electric Co. Cleveland, Ohio: Author, Jan. 1975, 4 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(M213)..Free

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Weldirectory of Electrodes for Mild and Alloy Steel

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, Feb. 1977, 8 pp.
(M210-C2A)..Free

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Weldirectory of Hardsurfacing Electrodes

Lincoln Electric Co. Cleveland, Ohio: Author, May 1974, 6 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(H211)..Free

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Weldirectory of Stainless Steel Arc Welding Electrodes and Techniques

Lincoln Electric Co. Cleveland, Ohio: Author, July 1977, 27 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(M212)..Free

Contents:

Part I covers: Electrode selection. Part II covers: Welding techniques and procedures.

* * * *

Which Welding Power Supply Do You Need?

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 16 pp. (EICO Canada Ltd., Weston, Ont.)
....$ .50

This booklet helps eliminate some of the mystery in the selection of the power source for a particular welding process.

XVII

TOOLS AND EQUIPMENT
NON-PRINT MATERIALS

OUTILS ET ÉQUIPEMENTS
MATÉRIEL NON IMPRIMÉ

CALCULATOR

Welding Preheat and Interpass Temperature Calculator (for Low Hydrogen Deposits)

Lincoln Electric Co., Cleveland, Ohio. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(WC-8).. $1.50

This slide rule type of calculator can be used to determine the minimum preheat required to prevent the cracking associated with the hardenability of the steel. The calculations are based on the use of low hydrogen processes because these processes are preferred when welding steels that require preheat. The instructions for using the calculator are included.

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HAND OPERATIONS - METALWORK SERIES

Welding Equipment (2-610A)
Setting Up, Lighting, Shutting Down (2-610B)
Making a Puddle, Running a Bead (2-610C)
Adding Filler (2-601D)
Cutting with Welding Torch (2-610E)
Forge, Tongs, Anvil (2-611A)
Forging on Flat (2-611B)

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
....$20.00 each

Super 8mm Colour Film with Captions

Specific techniques are taught for hand metalwork and the correct use of the proper tools for various kinds of hand metalwork at each stage of operation are demonstrated.

Recommended Levels: Grades 7 and 8

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LENS SHADE SELECTOR

Lens Shade Selector

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)
(A6.2-73)..$1.65

11" x 17" Wall Chart. 1973.

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MACHINE CONNECTION

Connecting Welding Machines

Marshall Maintenance, Trenton, N.J. (Electrolab Ltd., Belleville, Ont.)
(21) Purchase..$185.00
Rental..$70/wk.

16mm Colour Film. Time: 10 mins. Also available in videocassette.

This film shows how to connect any motor into a switch box or circuit breaker panel, but especially with regard to a welding machine.

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MACHINE OPERATION AND MAINTENANCE

Inert Gas Shielded Arc Welding Machine - Operation and Maintenace Maintenance

U.S. Army, Washington, D.C. (National Audio-Visual Center, Washington, D.C.)
(001900/JJ)..$95.00

16mm Black and White Film. Time: 28 mins. 1961.

The features, operation, and the maintenance of metal inert gas and tungsten inert gas shielded arc welding equipment which can be used for welding ferrous and nonferrous metals are explained.

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MACHINE OPERATIONS - METALWORK SERIES

Fastening Metals

Moreland-Latchford Films, Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
(9-656)..$175.00

16mm Colour Film. Time: 13 mins.

Various rivets and hammers are shown with a demonstration of metal joining. Blind or "pop" rivets are shown in use. Also illustrated are: laying out, centre punching, aligning and drilling holes; screws and bolts; self-tapping screws; stove bolts; cap screws; spot welding with portable equipment; squeeze time; weld time; hold time, and off times.

Recommended Levels: Intermediate, Senior, and Adult Education.

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MACHINE OPERATIONS - METALWORK SERIES

Riveting (9-656A)
Blind Rivets (9-656B)
Fasteners and Correct Size Holes (9-656C)
Screws and Bolts (9-656D)
Spot Welding (9-656E)

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Films, Toronto, Ont.)
....$20.00 each

Super 8mm Colour Film with Captions

Close-up camera work shows each tool in action as the operator demonstrates correct and efficient techniques.

Recommended Levels: Grades 7 and 8.

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METAL - TRAVAIL A LA MACHINE

Fixation des métaux

Moreland Productions Ltd., Toronto, Ont. (Les Entreprises Internationales Tele-Film Ltée., Montréal, P.Q.)

Vente	$210.00
Location	$35.00
Visionnement	$10.00

Il y a plusieurs sortes de rivets et de marteaux pour faire les joints de la tôle. On trace correctement la pièce, on utilise le pointeau, on aligne la pièce et on perce les trous. On présente l'emploi des vis, des boulons, des vis qui taraudent leur propre trou, des vis à métal et des vis à tête ronde. On montre la soudure par point en utilisant un appareil portatif. Finalement, on explique les quatre étapes de la soudure--la mise en place des pièces, la soudure proprement dite, la fixation et l'arrêt.

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METALWORK - HAND TOOLS

Forging Iron
Measuring and Marking Tools
Metal Filing
Soldering Methods
Using Snips and Shears
Welding Techniques

Moreland-Latchford Productions Ltd., Toronto, Ont. (School Services of Canada Ltd., Toronto, Ont.)
(29)..$85.00/Set
....$16.50 each

Filmstrips/Cassettes/Guide

The basics and fine points of hand metalwork are shown in step-by-step detail. Close-up photography points out the tools and how to use them in layout, shaping various kinds of metal and fastening parts together. Safe practices are emphasized.

Recommended Levels: Grades 7, 8 and High School.

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METALWORK - MACHINE OPERATION SERIES

Metal Fastening Methods

Moreland-Latchford Productions Ltd., Toronto, Ont. (School Services of Canada Ltd., Toronto, Ont.)
(30)..$14.50

Filmstrip/Cassette/Guide

Correct and efficient techniques are demonstrated.

Recommended Levels: Grades 7, 8 and High School

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METALWORKING SERIES

Hand Tools (M TDT 42)
Machines (M TDT 43)

Career Aids, Inc., North Hollywood, Calif.
....$10.00 each

12-16 Transparencies/8-16 Duplicating Masters/Teacher's Guide

This material provides the required knowledge prior to hands-on experience.

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METALWORKING SERIES - SHEET METAL

Hand Tools

Milliken Publishing Co., St. Louis, Mo. (Scholar's Choice, Stratford, Ont.)
(TDT42)..$11.00

16 Transparencies/12 Duplicating Masters

Contents:

Snips; Snips-folders; Rivet set, punch, hand seamer, hole saw, hacksaw; Layout tools; Punches and chisels; Hammers, mallets; Circumference rule; Gauges, micrometer; Micrometer readings; Files; Steel stakes; Cast stakes; Universal holder and stake set; Metal spinning; Fluting and doming; and Template layout and cutting.

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OXY-ACETYLENE

Oxy-acetylene Equipment and Processes

Vocational Agriculture Service, College of Agriculture, Urbana, Ill.
(454A) Slidefilm...$5.30
Slide Set - 2" x 2" Colour Slides $10.65
Cassette...$3.50

61 Frames

This item was originally designed for the agricultural mechanics trade.

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OXY-ACETYLENE

Oxy-acetylene Equipment Setting-Up

Vocational Agriculture Service, College of Agriculture, University of Illinois at Urbana - Champaign, Ill.
(456A) Slidefilm..$5.10
Slide Set...$10.05
Cassette..$3.50

57 Frames

This item was originally designed for the agricultural mechanics trade.

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SCREEN

Plastic Lumarith Screen

Lincoln Electric Co. of Canada Ltd., Toronto, Ont.
(WC-37)...$10.20/sheet

The screen is made from a special plastic material which can be placed around demonstration tables. It can be used in the roll form in which it comes or placed in a frame for portability in the shop, and easily moved away when the table is to be used for practice. It can also be used for demonstrating arc welding or gas welding. The screen is available in sheets of 20" x 50".

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SHEET METAL CONSTRUCTION HAND TOOLS

Soldering Irons

DCA Educational Products, Warrington, Penna. (Brodhead-Garrett, Cleveland, Ohio
(124481 SHH-7)..$5.00

Multicoloured Transparencies.

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SHOP TOOLS

Shop Tools

John Deere Service Publications, Moline, Ill.
(FOS-51...$18.00

45 Slides in 35mm Colour in Standard 2" x 2" Frames

This slide set is numbered in the same sequence as in the manual *Shop Tools*.

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SOLDERING TOOLS

Hand Tools: Soft Soldering

Medex Educational Supplies, Toronto, Ont.
(C732)...$1.00 plus postage

Coloured Wall Chart

This mounted wall chart measuring 20" x 30" is made of heavy paper.

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XVIII

SOLDERING
PRINT MATERIALS

BRASAGE
MATÉRIEL IMPRIMÉ

BASIC PRINCIPLES

Introduction to Soldering

Visual Education Centre, Toronto, Ont.
(6997K)..$33.00

Colour Filmstrip/Cassette

This filmstrip gives the step-by-step procedures for home repair soldering.

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BASIC PRINCIPLES

Soldering

Jam Handy Organization, Detroit, Mich. (Prentice-Hall of Canada Ltd., Scarborough, Ont.)
(KD934)..$32.00

Colour Filmstrip/Cassette. 1978.

The basic procedures, safety precautions, and the correct use of the tools to carry out the basic soldering operations are introduced. The various types of joints soldered with several different types of solder are explained as well as completing the job.

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BRAZING AND SOLDERING

Brazing and Soldering

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-734713)

Colour/Sound Filmstrip (80 Frames). Time: 21:01 mins.

The filmstrip presents the basic techniques necessary for bronze surfacing, braze welding, brazing, and silver soldering (brazing).

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second) $40.00

Recommended Levels: Secondary, College, Vocational, Adult

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COPPER TUBING

Copper Tubing: Silver Soldering

Visual Education Centre, Toronto, Ont.
(6992K)..........$33.00

Colour Filmstrip/Cassette.

The use of an acetylene torch to silver solder a swaged fitting to produce a leakproof connection is shown.

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COPPER TUBING

Copper Tubing: Soft Soldering

Visual Education Centre, Toronto, Ont.
(6992K)..........$33.00

The use of an acetylene torch to soft solder a swaged fitting to produce a leakproof connection is illustrated.

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COPPER TUBING

Soldering and Brazing Copper Tubing

Marshall Maintenance, Trenton, N.J. (Electrolab Ltd., Belleville, Ont.)
(20) Purchase..........$240.00
Rental..........$70/wk.

16mm Colour Film. Time: 13 mins.

This film shows how to produce good joints, using soft solder as well as hard solder in joining copper tubing and capillary fittings.

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ENGINEERING CRAFT STUDIES

Joining: Welding and Soldering

BBC Film Sales, Toronto, Ont.
....$300.00

16mm Colour Film. Time: 20 mins. 1972.

The aim of this film is to identify the basic principles relating to the thermal methods of joining materials together. Workshop investigations which help to illustrate these principles are included, especially where the demonstration is time-consuming or beyond the scope of normal college facilities.

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HAND OPERATIONS - METALWORK SERIES

Soldering Equipment (2-609A)
Tinning an Iron (2-609B)
Tinning Metal (2-609C)
Soldering Seams (2-609D)
Hand Soldering (2-609E)

Moreland-Latchford, Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
....$20.00 each

Super 8mm Colour Films with Captions. Time: 13 mins. each.

These films teach the specific techniques for hand metalwork and demonstrate the correct use of the proper tools for various kinds of hand metalwork at each stage of operation. Various solders are explained, and the types of soldering irons are demonstrated. Furnace and electrically heated irons are compared. The importance of keeping the iron clean, the use of flux on the iron and on the surface of the metal are stressed. The techniques of soldering a seam and the use of the blowtorch for hand soldering are demonstrated.

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METALWORKING SERIES

Riveting, Soldering and Forming Seams

Milliken Publishing Co., St. Louis, Mo. (Scholar's Choice, Stratford, Ont.)
(TDT41)..$11.00

16 Transparencies/12 Duplicating Masters.

Contents:

Rivets; Using rivets for assembly; Soldering (cleaning, tinning, soldering technique); Soldering (solder, flux, sweat soldering); Soldering equipment (torch, types of flux, copper, gun); Edges and hems; Common seams; Forming a wire edge; Forming the Pittsburgh Lock; Forming a double seam--forming a grooved seam; How to use pop rivets; Nails, screws, bolts, rivets; Punching holes; Drilling holes in sheet metal.

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METHODS

Soldering Methods

Moreland-Latchford Productions Ltd., Toronto, Ont. (Britannica Learning Materials, Toronto, Ont.)
(ML0294)..$16.50

Filmstrip/Cassette/Guide

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SHEET METALWORK SERIES #507

Assembly and Fastening

Bergwall Productions Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)
....$28.00

Colour Filmstrip/Cassette/Study Guide

This filmstrip demonstrates riveting, sheet metal screws, pop rivets, soldering and brazing as a means of fastening sheet metals together. Also shown are the various forms of seams commonly used in the sheet metalworking process.

* * * *

SHEET METALWORK SERIES

Cutting Sheet Metal
Making Holes in Sheet Metal
Riveting and Fastening
Seams and Joints
Soldering

Career Aids, Inc., North Hollywood, Calif.
(PHVE934)..$28.00

Five Colour Filmstrips/Five Cassettes/Instructor's Guide

These filmstrips show how to use the tools of the sheet metal trade. They demonstrate the application of tools to certain common handwork operations. Care and safety in performing the work is stressed.

* * * *

SOFT SOLDERING

Soft Soldering

Medex Educational Supplies, Toronto, Ont.
(C732).....................................$1.00 plus postage

Wall Chart. 1972.

This unmounted wall chart measuring 20" x 30" is made of heavy paper.

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SOFT AND HARD SOLDERING

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
....$29.95 each

Regular 8mm/Super 8mm Silent Filmloops in Technicolor Cartridges

Each filmloop explores one facet of the soldering technique and its content is integrated with that of the companion loops in the series.

1. *The Range of Soft Soldering* (300/C1)

   The importance of "wetting" over the whole of the surface contact area and sufficient of the non-contact area to ensure good bond strength and the uses of soft soldered joints are demonstrated.

2. *Soft Soldering - Bonding Theory* (300/C2)

   The interlocking of the molecular structure of the solid parent metal, the solidified solder, the heating to expand the space lattice, and the interlocking of both parent lattices are demonstrated.

3. *Soft Soldering - Applying the Solder* (300/C3)

"Grounding" electrically heated soldering coppers, adequate fume ventilation, the accessibility of the joint zone, and the speed of soldering copper movements related to the mass of patent metal are demonstrated.

4. *Soft Soldering - Cleaning* (300/C4)

Surface cleansing before applying the solder and the removal of sufficient chemically bonded surface oxide contamination of parent metal surface molecules are demonstrated.

5. *Soft Soldering - Fluxing* (300/C5)

The application of flux, soldering, and the removal of the excess flux to prevent surface corrosion are demonstrated.

6. *Soft Soldering - Using the Tools* (300/C6)

The orderly layout of all tools needed to achieve systematic and effective operation, the importance of ventilation, and the speed with which the solder is applied are demonstrated.

7. *Hard Soldering - Function and Appearance* (300/C7)

Butt joints, lap joints, joggled lap joints, the high strength and neatness achieved in hard soldering, gas flame, and the joining of metal are demonstrated. Stress is laid on the adequate safety clothing and goggles.

8. *Hard Soldering - Fluxing and Laying the Joint* (300/C8)

The nine stages for the preparation of depositing hard solder to achieve an efficient joint are demonstrated.

Recommended Levels: Secondary, Industrial, and Further Education

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SOLDERING COPPERS

The Use of Soldering Coppers

U.S. Navy, Washington, D.C. (National Audio-Visual Center, Washington, D.C.)
(003831/JJ)..$26.50

16mm Black and White Film. Time: 8 mins. 1954.

This film demonstrates the techniques of soft soldering in a sequence of operations, including the proper selection and tinning of the copper; the correct heating, cleaning, fluxing of the surfaces to be soldered; and transferring sufficient heat from the copper.

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XIX

SOLDERING
NON-PRINT MATERIALS

BRASAGE
MATÉRIEL NON IMPRIMÉ

Basic Sheet Metal Skills

Johnston, P.M., & Liebowitz, M. Albany, N.Y.: Delmar Publishers, 1977, 288 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
Text..$10.50
Instructor's Guide..$2.50

This text concentrates on the basic layout and fabrication practice. The Instructor's Guide contains the answers to all of the Review Questions and provides lesson plans to assist the instructor.

Contents:

62 units including: Safe practices with hand tools and floor machines; Seams and cleats; Seam layouts and fabrications; Hems-bar folder; Forming and crimping round pipe; Square duct and connections; The 90-degree square elbow; The 45-degree change angle; The 90-degree with a clinch edge; Tolerances, linear measure, reduction problems; Offsets; Round pipe and collars; Parallel line development; Chimney flashing; Roof pitch; Roofs; Round T-intersection between pipes of different diameters; Adjustable elbows; Triangulation; Transitions with two and three straight sides; Transitions with three and four slant sides; Rectangular-shaped transitions; Square to round fittings; Rectangular to round off-center fitting on a pitch; Fastening devices; Soldering vertical seams; Transition offsets; Discharge-stack hood; Appendix; and Index.

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Electrical Soldering

Dezettel, L.M. Indianapolis, Ind.: Howard W. Sams & Co., Inc., Publishers, 1976, 144 pp. (Lenbrook Industries, Scarborough, Ont.) (21411)...$6.00

This book teaches the "hows" and "whys" of electrical soldering. It explains solder alloys and fluxes and discusses the various types of soldering devices. Also explained are the principles of good soldering and acquiring the needed skill.

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Metals - Soft Solder and Fluxes

Jensen, J.T. Anchorage, AK: Author, SRA Box 381-C, 1967, 1 piece, 10 pp. Microfiche only.
....Free

Recommended Levels: Secondary and Post-Secondary Education

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The Metalworking Handbook: Principles and Procedures

Adams, J.T. New York, N.Y.: Arco Publishing Co., Inc., 1976,
320 pp. Clothbound.
(0-668-03857-8 LR)..$13.00

Step-by-step drawings, an index, and a metric conversion chart are included with this text.

Contents:

Description of metals and plastics; How to measure with tools and how to use them; The choice of tools; How to work with metal; Soldering materials and procedures; Sheet metal fasteners; Layout and benchwork; Drilling and drilling machines; Operating milling machines; and Fundamental shaper operations.

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Sheet Metal Hand Processes

Zinngrabe, C.J., & Schumacher, F.W. Albany, N.Y.: Delmar Publishers, 1974, 216 pp., 331 illustrations. Softcover.

Text	$7.00
Instructor's Guide	$5.50

This text introduces the beginning sheet metal technician to basic instruction in the properties and selection of metal and the processes performed with measuring and marking, bench, cutting, piercing, joining, and soldering tools. The selection and use of the proper tool for a particular operation is stressed. The units begin with clearly stated objectives and end in review questions.

Contents:

Measuring and marking tools; Bench tools; Metal cutting tools; Metal piercing and special job tools; Metal joining tools; Soldering processes; Metalworking processes; Review; Decimal equivalents; and an Index.

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Sheet Metal Shop Practice

Meyer, L. Chicago, Ill.: American Technical Society, 1975, 316 pp.

	$10.80
Study Guide	$3.60

This newly revised basic text is concerned with the layout and the actual fabrication and construction methods used in manufacturing sheet metal components. It presents machine and tool usage, patterns, layout and construction. Additional information regarding terminology, illustrations, materials and fasteners, job opportunities and safety is given. A glossary of trade terms plus more information on plastics is also included.

Contents:

Tools, machinery, safety; Sheet metal types; Material, fasteners; Patterns and cutting metals; Punching, drilling, riveting; Folding edges, making seams; Turning, burring, raising; Forming, crimping, beading, grooving, soldering; Pattern drafting; Making and notching simple patterns; Plastics; and Short method of pattern development.

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Sheet Metal Technology

Budzik, R.S. Indianapolis, Ind.: Howard W. Sams Co., Inc., Publishers, 1975, 320 pp. Hardbound. (Lenbrook Industries, Scarborough, Ont.)
(20751)...$12.00
(20906) Instructor's Guide..............................$2.75

The organization of this textbook enables the junior-high and senior-high school students to begin meaningful shopwork within the first few days, which continues through each learning unit for one semester. The learning units are centered around projects requiring minimum cost, minimum amount of material, and minimum equipment.

Contents:

Occupational opportunities; Safety; Materials and supplies; Hand tools; Measuring, marking, layout; Squaring shear; Bending brakes; Slip roller; Notching, punching, drilling, riveting, soldering; Edges and seams; Precision layout; Ductwork; Assembling; Plastics in sheet metalwork; Finishing; Mass production; and 45 projects.

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Silver Soldering

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author, 1973, 7 pp.
(604-B)...$ .38

This learning module which which includes two tests is designed for industrial mechanics.

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Soft Soldering

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author, 1973, 7 pp.
(604-A)...$ .38

This learning module which includes two tests is designed for industrial mechanics.

* * * *

Soldering

Thwaites, C.J., & Barry, B.T.K. Don Mills, Ont.: Oxford University Press Canada, 1975, 30 pp.
....$4.00

This guide, the seventh in the Engineering Design Guides Series, gives the correct specifications of the basic metals. It also deals with the selection of materials and soldering methods to produce the best results, and with the design of joints and jigging systems for maximum efficiency. The properties of solders and soldered joints are described and appropriate tests methods are discussed.

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Soldering for Home, Farm and Shop Applications

Vocational Agriculture Service, College of Agriculture, University of Illinois at Urbana-Champaign. Urbana, Ill.: Author,
(3027)

This printed pamphlet is intended for student text and reference use. It measures 8-1/2" x 11" in size and is punched for a three-ring notebook.

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Soldering Manual

American Welding Society. Miami, Fla.: Author, 1978, 160 pp. Clothbound. (Canadian Welding Society, Weston, Ont.)
(SM)..$16.50

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Soldering Skills - Copper Tubing

Instructional Materials Laboratory, University of Missouri-Columbia. Columbia, Mo.
(AG-900-P)..$ .75

This is a single sheet plan exercise for agricultural mechanics.

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Soldering Wire Connections

Continuing Education Publications Division, Oregon State Department of Education. Portland, Oreg.: Author, 1973, 7 pp.
(604-C)..$ .38

This learning module which includes two tests is designed for industrial mechanics.

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XX

SOLDERING
PACKAGED COURSES

BRASAGE
COURS

ELECTRICAL CONNECTIONS

Soldering Electrical Connections

Dorsett Educational Systems, Inc., Norman, Okla.

(Oa10) With Filmstrip	$17.50
With Slides	$20.00

Filmstrip/One Side of an Audio Cassette/Reference Folder/ Progress Check Tests

The lesson requires about 20 to 30 minutes including responses and post-testing time. It is paced rapidly and is intended to be repeated for thorough learning. The Progress Check Tests for pre- and post-testing are printed on computer-card size sheets and may be graded quickly by a masked plastic overlay. The Reference Folder contains the entire audio script, plus the multiple-choice responses from the filmstrip.

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HIGH RELIABILITY SOLDERING AND CONNECTIONS COURSE

Soldering Bifurcated Terminals
Soldering Terret Terminal Connections (Single-Wire)
Soldering Hook Terminal Connectors (Single-Wire)
Component Lead Bending

National Laboratory for the Advancement of Education, Washington, D.C.

Complete Course	$101.80
4 Video Tapes	$90.00
Instructor Print Materials, 18 pp	$1.80
Student Print Materials, 100 pp	$10.00

Special Package: 1 Set of Instructor Materials
20 Sets of Student Print Materials
1 Video Tape containing 4 Motion Pictures..............................$233.44

4 Video Tapes/Instructor Print Materials/Student Print Materials (texts, workbooks, and programmed units). All motion pictures have been transferred to video tape and are available in either 3/4" cassette or 1/2" reel-to-reel formats. 1978. Time: 46 Hrs.

The course is self-paced, therefore, measurement is accomplished by an evaluation of each project as it is completed.

Contents:

Conductive and resistive soldering; Stranded conductor stripping and tinning; Terminal soldering; Connector pin connections; Printed circuit board preparation; and the Replacement of microminiature devices on printed circuit boards.

XXI

SAFETY
PRINT MATERIALS

SÉCURITÉ
MATÉRIEL IMPRIMÉ

Braze Safely

American Welding Society. Miami, Fla.: Author, Feb. 1971.
(Canadian Welding Society, Weston, Ont.)
....Free

This pamphlet is intended to alert users to the hazards involved when torch brazing where toxic fumes may evolve. The general principles for avoiding these hazards are outlined.

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Code de bonne pratique pour la conception et l'utilisation des pompes centrifuges à oxygène liquide

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1973, 22 pp.

Bilingue français/anglais.

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Code de bonne pratique pour les installations de stockage d'azote et d'argon liquides chez les utilisateurs

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1972, 10 pp.

Bilingue français/anglais

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Code de bonne pratique relatif à l'utilisation du matériel oxyacétylénique

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1970, 42 pp.

Bilingue français/anglais

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Consignes d'utilisation des postes de chauffage, soudage, coupage oxyacétyléniques et oxy-gaz combustibles

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 8 pp.

Cette brochure a pour but de rappeler les précautions essentielles qui doivent être prises pour la mise en service, l'entretien, l'utilisation et l'arrêt des postes oxyacétyléniques et oxy-gaz combustibles: elle est également valable pour les postes équipés de chalumeaux oxycoupeurs. Elle constitue un condensé des connaissances minimales que doivent posséder les utilisateurs pour que la sécurité soit assurée. Elle concerne spécialement les postes individuels alimentés par un couple de bouteilles et les installations fixes ne permettant l'utilisation conjointe que de quelques chalumeaux.

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The Facts About Fumes

Canadian Welding Society. Weston, Ont.: Author, 31 pp.
(FU)..$4.25

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Metal Lathe (VE-621H-H)
Gas Forge (VE-622H-H)
Arc Welder (VE-623H-H)
Oxy-acetylene Welder (VE-624H-H)

Hobar Publications. St. Paul, Minn.: Author
....$1.00/pad

These safety exams for power tool safety and operation are available in pads of 25 sheets per pad. They are suitable for classroom use.

* * * *

Power Tool Safety and Operation

Hoerner, T.A., & Bettis, M. St. Paul, Minn.: Hobar Publications, 1973, 96 pp. $4.00
(173)...$4.00

This student manual covers the safety and operation of the 24 most popular woodworking, metalworking, and metals and welding power tools. The areas covered on each of the 24 power tools include: part identification; safe operational procedures; general safety practices; and ten completion questions.

Recommended Levels: Secondary, College, and Vocational Education.

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Prévention d'accidents résultant de la suroxygénation ou de la sousoxygénation de l'atmosphère

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18:
Auteur, 1976, 17 pp.

Ce document attire l'attention sur les dangers que présentent la production, la manipulation, le stockage, le transport et la distribution des gaz de l'air qui sont de plus en plus utilisés, dans une très large variété d'industries. Il constitue un guide sûr pour l'utilisateur en lui indiquant les moyens d'éviter les accidents et, s'ils surviennent, de limiter leurs conséquences. Ce document existe en version française et anglaise.

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Recommandations relatives aux caractéristiques physiques des gaz et des liquides à utiliser en pratique dans l'industrie des gaz comprimés

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18:
Auteur, 1973, 5 pp.
(28)..Gratuit

Bilingue français/anglais.

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Recommended Safe Practices for Gas Shielded-Arc Welding

American Welding Society. Miami, Fla.: Author, 1966, 8 pp.
(Canadian Welding Society, Weston, Ont.)
(A6.1-66)..$2.20

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Recommended Safe Practices for Plasma-Arc Cutting

American Welding Society. Miami, Fla.: Author, 1969, 11 pp.
(Canadian Welding Society, Weston, Ont.)
(A6.3-69)..$4.40

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Safe Practices for Welding and Cutting Containers that have held Combustibles

American Welding Society. Miami, Fla.: Author, 1965, 16 pp.
(Canadian Welding Society, Weston, Ont.)
(A6.0-65)..$2.20

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Safety for Sheet Metal Workers

Zinngrabe, C.J., & Schumacher, F.W. Albany, N.Y.: Delmar Publishers, 1977, 64 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)

Text	$3.25
Instructor's Guide	$ .80

This book was designed primarily for use by the beginning student of the sheet metal trade. The main emphasis is on accident prevention. Photographs of on-the-job sheet metal workers and shop equipment are used to illustrate the proper safety procedures.

Contents:

Sheet metal handling and storage; Sheet metal scrap; Sharp pointed hand tools; Metal cutting and bench tools; Soldering equipment; Cutting machines; Forming machines; Portable machine tools; Stationary machines; Working conditions; Above ground level work; Comprehensive review; Answers to comprehensive review; and a Certificate of completion.

* * * *

Safety in Welding and Cutting (U.S. Standard)

American Welding Society. Miami, Fla.: Author, 1973, 69 pp.
(Canadian Welding Society, Weston, Ont.)
(ANSI Z49.1-73)..$6.60

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Sécurité dans l'emploi des chalumeaux soudeur et coupeur

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1975, 33 pp.

Ce document, après énumération des normes ou propositions de normes internationales existantes pour les équipements

oxyacétyléniques, reprend des extraits d'une brochure de la C.P.I. concernant les recommandations aux utilisateurs de ces équipements pour un travail en sécurité. Ce document existe en version française et anglaise.

* * * *

La sécurité dans la production et l'utilisation de l'acétylène

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18:
Auteur, 1974, 210 pp.

Bilingue français/anglais.

* * * *

The Welding Environment (Fumes and Gases)

American Welding Society. Miami, Fla.: Author, 1976, 169 pp.
(Canadian Welding Society, Weston, Ont.)
(WE)..$22.00

Contents:

Part I covers: Review of the literature on welding fumes and gases. Part II covers: Experimental study of arc-welding fumes and gases. Part III covers: Proposed procedures for sampling and analysis of welding fumes and gases.

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XXII

SAFETY
NON-PRINT MATERIALS

SÉCURITÉ
MATÉRIEL NON IMPRIMÉ

AGRICULTURE

School Shop Safety - Part I

Vocational Education Productions, California Polytechnic State University, San Luis Obispo, Calif.
(1-700-131)..$18.00

Filmstrip/Tape Cassette/Illustrated Script

Partial Contents:

Safe design factors in the shop; Extinguishing class A, B, and C fires; Personal safety precautions; Safety precautions for welding; Specific performance objectives; and Discussion questions.

* * * *

ARC WELDING

Arc Welding Safety

Abraxas Films, Capitola, Calif.
(1D1)..$30.00

Colour Filmstrip/Cassette (106 Frames). 1978.

This program may be used for group instruction and for individualized modular learning. There are review sections and a sample multiple-choice test is included.

Contents:

Protective clothing and eye protection; Descriptions of the equipment and basic safety; Precautions relating to the equipment; Dry floors; Gas and other flammable materials; Spot welding; Electrodes; Condition of the work area; Hazards of playing around in the shop; Fire extinguishers; and Attitude.

Recommended Levels: Junior and Senior High School, College, and Vocational/Occupational Learning Centres.

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ARC WELDING

Introduction to Welding Safety with Arc Welding Safety

The 2000 Co., Costa Mesa, Calif.
(2-1D1-RC)...$72.00

Two Colour Filmstrips/Two Cassettes/Tests

This program includes review sections which synchronously "break" for tests. It is suitable for individual or group instruction.

Recommended Levels: Junior and Senior High School, College, and Vocational/Occupational Learning Centers.

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BASIC PRACTICES

Safety in the Shop: Basic Practices

Moreland-Latchford Productions Ltd., Toronto, Ont. (Coronet Instructional Media Ltd., Markham, Ont.)
(3151)..$220.00

Colour Film. Time: 13 mins.

The worker's responsibility for safety in using hand and power tools in both the wood and metal shops is emphasized. This film also shows the importance of proper clothing, the safe way to lift and carry, the value of tidiness in a shop, and ways to guard against possible fires.

Recommended Levels: Junior and Senior High School, College, and Adult Education

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BASIC PRINCIPLES - ELECTRIC ARC

Always on the Job

Airco Welding Products, Union, N.J.
(8242-0142) Black and White Filmstrip with 33-1/3 record...$25.00
(8242-0143) 35mm Slides with Tape Cassette.................$35.00

Time: 20 mins.

This presentation is a companion safety presentation to *The Guy Behind Your Back*. The same characters interpret the basic principles of safety in electric arc welding. It is available for the filmstrip and slides entitled *Recommended Safe Practices in Cutting and Welding* (ADE 872).

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BASIC PRINCIPLES: GAS WELDING AND CUTTING

Weld in Safety

Richard Need Productions Ltd., London, England. (International Tele-Film Enterprises, Toronto, Ont.)

English - Purchase	$445.00
French - Purchase	$495.00
Rental	$ 40.00

16mm Eastman Colour Film. Time: 22 mins. 1976.

This film on the safety aspects of gas welding and cutting, is useful as basic training for new welders and as a refresher for old hands. Illustrated teacher/student notes, of which extra copies are available, are included.

Contents:

Cylinders: Recognition and colour coding; Handling; Leak-testing. Gases: Properties of oxygen; Effect of; and Precautions against; Oxygen enrichment of the atmosphere; and Keeping oxygen fittings oil-free. Properties of acetylene, safe pressures, non-use of copper with acetylene, keeping acetylene cylinders upright, precautions against explosive mixtures. Properties of propane, precautions against explosive mixtures, precautions against propane collecting in low-lying places, recognition by smell. Equipment: Using the correct equipment for the gas in use; Hose colour codes; Right-hand and left-hand threads. Safe way of assembling welding set. Correct lighting-up and closing down routine. Precautions against back-feeding with emphasis on the importance of purging. Use of spark lighter. Protective clothing; Safety Devices: A review of safety features which can be built-in to equipment including bursting diaphragms; Safety backs to gauges; Hose-check valves and flashback arrestors.

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BASIC PRINCIPLES: OXY-FUEL

The Guy Behind Your Back

Airco Welding Products, Union, N.J.

(8242-0140)	Colour Filmstrip and Tape Cassettes with Inaudible Cue Signals	$25.00
(8242-0141)	35mm Slides and Tape Cassettes with Inaudible Cue Signals	$35.00

Time: 20 mins.

This presentation uses cartoons and actual shop photographs to teach the basic principles of oxy-fuel safety.

Hand-out materials are available for the filmstrip and slides entitled *Recommended Safe Practices in Cutting and Welding* (ADE 872).

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BRAZING

Braze Safely

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)
(BRS) Minimum order of 100 copies .... $6.50 per 100 copies

9" x 16" Chart. 1971.

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ELECTRIC WELDING

Electric Welding: Safety and Setup

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC72-734716)

Colour/Sound Filmstrip (55 Frames). Time: 16 mins.

This filmstrip explains: Required amperage-voltage; Base metal combinations; Selection of polarity; Choice of type of electric arc for specific applications; and the Safety factors pertaining to the basic processes.

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second)	$40.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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GAS WELDING

Gas Welding Safety

Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Ill.
....$5.80

Transparencies (40 Frames)

These transparencies were originally designed for the agricultural mechanics trade.

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GENERAL SHOP

General Shop Safety

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC76-730023)

Colour/Sound Filmstrip (51 Frames). Time: 13:04 mins.

This filmstrip is concerned with introducing students to safe shop practices. It deals with such things as proper housekeeping, fire prevention measures, colour codes, care and handling of chemical and plastic materials, as well as personal protection through the use of eye glasses, safety shoes, and protective masks and clothing. Visual examples are presented with colour photographs of correct situations and cartoon sequences when applicable.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$40.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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GENERAL SHOP

Safety in the Metal Shop

RMI Educational Films, Inc., Kansas City, Mo.
(8121)..$25.00

Colour/Sound Filmstrip Available with a Cassette or Record. 1971.

Practical illustrations concerning clothing, eye protection, using hand tools, operating power machinery, working around hot metal, and good housekeeping are given.

Recommended Levels: Junior and Senior High School, and College Education.

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MACHINE/METAL SHOP

Introduction to Machine/Metal Shop Safety

Abraxas Films, Capitola, Calif.
(1E1)..$42.00

Colour Filmstrip/Cassette (114 Frames). 1976.

This filmstrip covers: protective clothing, hazards of long hair and loose clothing; use of the correct tools and the use of tools that are in good condition. Also covered are: clean tools and work areas; safety zones; fire extinguishers; guards; compressed air; basic electrical safety; and eye protection. The filmstrip has been developed around the principle of teaching safety with teaching a skill. Safety procedures as they directly relate to the safe operation and handling of the equipment are emphasized. Review sections and a sample multiple-choice tests are included. The filmstrip may be used for group instruction and for individualized modular learning.

Recommended Levels: Junior and Senior High School, College, and Vocational/Occupational Learning Centers.

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MAPP® GAS THEORY AND PRACTICE SERIES #6

Equipment Setup and Shut-Down

Airco Welding Products, Union, N.J.
(8242-0144)...$40.00

Black and White Video Tape Cassette-U-Matic 3/4". Available in 16mm or Super 8 upon request at additional cost. Time: 20 mins.

The method of safely setting up the oxy-fuel apparatus for hand cutting and shutting down the equipment is demonstrated. Also demonstrated is the safe use of torch check valves and bleeding out the hose for shut-down.

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METAL SHOP SKILLS: SAFETY AND OPERATIONS SERIES

A.I.M.S. Instructional Films, Glendale, Calif. (International Tele-Film Enterprises, Toronto, Ont.)

The six colour films in this series feature clear, close-up photographs of the basic procedures. Each film's major emphasis is on safety demonstration and the basic operations. "Tight" shots illustrate the close-up detail of procedures otherwise potentially hazardous to demonstrate.

	Sale Price	Rental	Preview
1. *Arc Welding: Safety and Operations* (14 mins.)	$253.00	$20.00	$10.00
2. *Oxy-acetylene Welding: Safety and Operations* (15 mins.)	260.00	20.00	10.00
3. *Facing on the Lathe* (8 mins.)	197.00	19.00	10.00
4. *Safety and Basic Fundamentals on the Engine Lathe/Part 1* (11 mins.)	197.00	19.00	10.00
5. *Safety and Basic Fundamentals on the Engine Lathe/Part 2* (13 mins.)	225.00	20.00	10.00
6. *Straight Turning Between Centres on the Lathe* (18 mins.)	305.00	25.00	10.00

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OXY-FUEL WELDING AND CUTTING

Safety in Oxy-Fuel Welding and Cutting

Victor Equipment Co. of Canada Ltd., Oakville, Ont.

Purchase	$295.00
Loan	Free

16mm Colour/Sound Film. Time: 30 mins.

This film concentrates on the fundamentals of safety and the preventative measures necessary for welding and cutting operations. The highlights include reverse flow and flashback demonstrations.

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OXY-ACETYLENE

Introduction to Welding Safety with Oxy-acetylene Welding Safety

The 2000 Co., Costa Mesa, Calif.
(2-1C1-RC)..$72.00

Two Filmstrips/2 Cassettes/Tests. 1976.

This program includes review sections which synchronously "break" for tests. It is suitable for individual or group instruction.

Recommended Levels: Junior and Senior High School, College, and Vocational/Occupational Learning Centers.

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OXY-ACETYLENE

Oxy-acetylene Safety and Setup

Mafex Associates, Inc., Johnstown, Penna. (Niagara Publishers, Fenwick, Ont.)
(LC72-734711)

Colour/Sound Filmstrip (78 Frames). Time: 19:16 mins.

The safety and setup procedures are well defined in this filmstrip. It illustrates the proper hook-up and adjustment of cylinders, gauges, and torches for use in fusion welding, flame cutting, soldering, and brazing. The safety requirements for each operation are explained as the operation is pictured.

One colour/sound filmstrip with double-sided phonodisc
....$28.00

One colour/sound filmstrip with audible signal cassette
....$30.00

One colour/sound filmstrip with 5" reel (3-3/4" per second)
....$40.00

Recommended Levels: Secondary, College, Adult, and Vocational Education.

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OXY-ACETYLENE

Oxy-acetylene Welding Safety

Prentice-Hall Media, Tarrytown, N.Y. (Prentice-Hall of Canada, Ltd., Scarborough, Ont.)
....$17.25

This filmstrip illustrates that oxy-acetylene welding is no more hazardous than other trades--if the proper safety rules and precautions are observed.

* * * *

OXY-ACETYLENE

Oxy-acetylene Welding Safety - Parts I and II

The 2000 Co., Costa Mesa, Calif.
(1C1, 1C2)..$50.00

Colour Filmstrip/Cassette (181 Frames). 1978.

Part I of this filmstrip gives a description of protective clothing, eye protection, the proper condition of the work area, fire hazards and fire extinguishers. It also covers the correct handling of gas cylinders, lifting correctly and the use of the right tools with fittings. Part II describes the equipment, the differences between oxygen and acetylene lines and fittings, detecting leaks, the use of regulators, lighting the torch and other basic safety procedures. Review sections and sample multiple-choice tests are included. These tests can also be used as worksheets. This filmstrip may be used for group instruction and for individualized modular learning.

Recommended Levels: Junior and Senior High School, College, and Vocational/Occupational Learning Centers.

* * * *

OXY-ACETYLENE AND ARC

Introduction to Welding Safety with Oxy-acetylene and Arc Welding Safety

The 2000 Co., Costa Mesa, Calif.
(3-1CD-UI)...$108.00

Three Colour Filmstrips/3 Cassettes/30 Tests

This program includes review sections which synchronously "break" for tests. It is suitable for individual or group instruction.

Recommended Levels: Junior and Senior High School, College, and Vocational/Occupational Learning Centers.

* * * *

OXY-ACETYLENE SERIES

Equipment Safe Practices

Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Ill.

(455A)	Slidefilm	$6.90
	Slide Set	$15.45
	Cassette	$3.50

93 Frames.

This item was originally designed for the agricultural mechanics trade.

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PERSONAL

Personal Safety

Milliken Publishing Co., St. Louis, Mo. (Scholar's Choice, Stratford, Ont.)
(TDT21)..$11.00

12 Transparencies/12 Duplicating Masters.

Contents:

Clothing and jewellery; Eye protection; Hot metal protection; Foundry area; Welding area safety equipment; Ventilation; Hair protection; Respiration equipment; Housekeeping during work; Lifting heavy objects; The mouth; and Carrying tools.

* * * *

PREVENTING FIRES

Preventing Cutting and Welding Fires

Film Communicators, North Hollywood, Calif.

Purchase	$250.00
Rental	$28/wk.

16mm Colour/Sound Motion Picture. Super 8mm films and video cassettes are available on special order.

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SAFETY PRACTICES IN THE SHOP SERIES

Using the Forge and Welding Equipment

Moreland-Latchford Productions Ltd., Toronto, Ont (Coronet Instructional Media Ltd., Markham, Ont.) $30.00
....$30.00

Colour Filmloop.

The importance of proper clothes, safe lifting, carrying, and neatness are explained. Safety practices are demonstrated when using sharp edges, great heat and high speed.

Recommended Levels: Grades 7 to 12 and College Education.

* * * *

SECURITE DANS L'ATELIER - FILMS

Principes fondamentaux

Moreland-Latchford Productions Ltd., Toronto, Ont. (Les Entreprises Internationales Tele-Film Ltée. Montréal, P.Q.

Vente	$210.00
Location	$35.00
Visionnement	$10.00

Film en couleur. Durée: 13 min.

Simplement et d'un façon compréhensive, on montre les principes de sécurité appropriés à toute usine, en appuyant sur les attitudes de base que les étudiants devraient développer pour manipuler en toute sécurité les outils à main et électriques. Le film montre les vêtements qui offrent une protection, les façons correctes de lever et de transporter les matériaux, la propreté dans l'usine et quelques règles pour éviter les incendies.

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SECURITE DANS L'ATELIER - FILMS

Les outils à main

Moreland-Latchford Productions Ltd., Toronto, Ont. (Les Entreprises Internationales Tele-Film Ltée. Montreal, P.Q.

Vente	$210.00
Location	$35.00
Visionnement	$10.00

Film en couleur. Durée: 13 min.

En se servant d'illustrations, on donne les notions de sécurité pour la manipulation des outils de coupe en insistant qu'ils soient bien aiguisés. Le film montre comment bien travailler avec les scies, les ciseaux à froid, les tournevis, les clés anglaises, les étaux, les outils à tôle et les chalumeaux. Note l'importance de se protéger les yeux et les mains.

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SECURITE DANS L'ATELIER - FILMS

Les outils électriques

Moreland-Latchford Productions Ltd., Toronto, Ont. (Les Entreprises Internationales Télé-Film Ltée., Montréal, P.Q.

Vente	$210.00
Location	$35.00
Visionnement	$10.00

Film en couleur. Durée: 13 min.

Cet film insiste sur les mesures de sécurité spéciales lorsqu'on travaille avec les outils électriques tels que foreuses, meules, rabots d'établi, toupies à rainures, scies à ruban, scies à découper, scies rondes et tours. Les mesures de sécurité près des parties mobiles, l'usage du bâton pour pousser les pièces et autres procédés de sécurité sont montrés. Aussi, le film montre comment vérifier le matériel et l'outil pour défectuosité, la bonne façon d'alimenter l'outil et de le régler. Enfin, il fait connaître et comprendre les principes de sécurité qui s'appliquent à tous les outils électriques.

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SHOP SAFETY SERIES

Safety in the Shop: Basic Practices

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)

(27-813)..$160.00

16mm Colour Film. Time: 13 min.

The worker's responsibility for safety in using hand and power tools in both the wood and metal shops is emphasized. Also shown is the importance of proper clothing, the safe way to life and carry, the value of tidiness in a shop, and ways to guard against possible fires.

Recommended Levels: Senior High School, College and Adult Education.

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SHOP SAFETY SERIES

Safety in the Shop: Hand Tools

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
(27-814)..$160.00

16mm Colour Film. Time: 13 min.

The reason for keeping hand tools sharp and clean--for safety's sake is illustrated. The correct use of common hand tools and safety precautions and to take when using them, and safe sheet metal, forge and welding practices are shown. The importance of protective clothing is also emphasized.

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SHOP SAFETY SERIES

Safety in the Shop: Power Tools

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
(27-815)..$160.00

16mm Colour Film. Time: 13 min.

This film stresses common sense practices in the use of woodworking and metalworking machines, the need for proper clothing, machine guards, making adjustment before starting the machine, dealing with broken blades, and value of neatness.

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SHOP SAFETY SERIES

Screwdrivers, Wrenches, Sheet Metal and Welding

Moreland-Latchford Productions Ltd., Toronto, Ont. (Britannica Learning Materials, Toronto, Ont.)
(ML0024)..........................:...................$16.50

Filmstrip/Cassette/Guide (48 Frames). Time: 11 min.

The clear and comprehensive still pictures of this filmstrip fully illustrate the most necessary safety procedures vital to the acquiring of safe practices. Shop vocabulary and the correct use of common tools, machines, accessories, and special equipment are given. Narration explains each detail to ensure an accuracy of understanding. (Also available in French).

Recommended Levels: Secondary, College, Vocational, Industrial and Apprentice Skills.

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TOOLS

Power Tool Safety and Operation

Hobar Publications, St. Paul, Minn.
(VE-373H-M)..$3.00

24 Transparency Masters. 1972.

These transparencies give a complete listing of power tools, both portable and stationary, with cut-away views and component parts call-outs.

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TOOLS

Safety Rules for Power Tools - Arc Welder and Oxy-acetylene Welder

Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Ill.
....$ .40 each

8½" x 11" Plastic Laminated Charts

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XXIII

SAFETY
PACKAGED COURSES

SÉCURITÉ
COURS

GAS AND CYLINDER SAFETY PROGRAMS

Union Carbide-Canada Ltd., Toronto, Ont.

35mm Slides/Tape Cassette (with both audible and automatic slide change signals)/Post Show Test/Industrial Gases Safety Precautions Booklet

The program can be used with any 35mm projector and cassette player. For automatic slide advance, a 1000 HZ projector/synchronizer is required. The programs are available in French also.

1. *Compressed Gases: Properties and Hazards* $75.00

   55 Slides. Time: 8 min.

   The hazards of compressed gases are described. The program is suitable for presentation to anyone who handles or works with compressed gases.

   Contents:

   Potential hazards of oxygen; Asphyxiation; Flammable gases; Specialty gases; Other properties and hazards.

2. *Gas Containers: Storage and Handling* $85.00

   78 Slides. Time: 12 min.

   The basic types of containers used for gases are described. The emphasis is on containers for compressed gases and liquified or dissolved fuel gases. Also included are the safe practices for moving, storing, and handling of gas cylinders in a variety of situations. The program is suitable for presentation to anyone using or handling welding, industrial or medical gas cylinders.

3. *Liquefied Atmospheric Gases: Properties and Handling* $75.00

   57 Slides. Time: 8 min.

   The program describes how liquefied gases are made and what their potential hazards are. The topics included are safe practices for handling liquefied gases and their containers.

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OXY-ACETYLENE WELDING SAFETY SERIES - INSTRUCTOR'S KIT

Oxy-acetylene Welding
Oxy-acetylene Apparatus
Oxy-acetylene Supply

Wasiloff, T., McGraw-Hill International Book Co., New York, N.Y.
(McGraw-Hill Ryerson Ltd., Scarborough, Ont.)

(79412-x)		$68.75
(68418-9)	Instructor's Guide	$2.00
(68418-9)	Student's Worktext	$2.29

Complete Course: 2 Audio Cassettes/3 Sets of Slides/Student Worktext. Time: 15 min.

The safety procedures and practices are described. The Student Worktext guides students through the program and provides additional background information.

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TOOLS

The Acetylene Torch, Safety Rules

Dorsett Educational Systems, Inc., Norman, Okla.

(Oall)	With Filmstrip	$17.50
	With Slides	$20.00

Complete Course: Filmstrip/One Aide of an Audio Cassette/Reference Folder/Progress Check Tests.

The lesson requires about 20 to 30 minutes including responses and post-testing time. It is paced rapidly and is intended to be repeated for thorough learning. The Progress Check Tests for pre- and post-testing are printed on computer-card size sheets and may be graded quickly by a masked plastic overlay. The Reference Folders contain the entire audio script, plus the multiple-choice responses from the filmstrip.

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TOOLS

Power Tool Safety and Operation Teaching Packet

Hobar Publications, St. Paul, Minn.

(VE-273H-I)	$8.00

Complete Packet: One Student Manual/Suggested Teacher and Student Activities/Over the 24 Power Tools/Safety Exams/Transparency Masters for Part Identification

This packet was developed to aid the instructor in teaching power tool safety and operation and in using the Student Manual.

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XXIV

METALLURGY
PRINT MATERIALS

MÉTALLURGIE
MATÉRIEL IMPRIMÉ

American Society for Metals Digest Series

American Society for Metals. Metals Park, Ohio: Author.
....$25.00 each

This series is for individuals interested in reviewing abstracts of new literature only in selected areas. Nine digests are printed monthly. Each one reproduces complete abstracts on the topic of interest, as published in *Metals Abstracts*.

Subjects:

1. *Casting* (64-A)

   This digest deals with continuous, centrifugal, permanent mold, billet, ingot vacuum, vibrational, slab, sand, shell mold, investment, pressure, and die processes.

2. *Cleaning, Finishing and Coating* (64-B)

   All metallic and nonmetallic coating and preparation processes are covered.

3. *Corrosion Prevention/Inhibition* (64-C)

   This is relevant literature for the control, resistance, and prevention of corrosion.

4. *Heat Processing* (64-D)

   Annealing, tempering, quenching, solution treating, flame/case hardening...techniques, equipment, control, and atmospheres are covered.

5. *Metalforming* (64-E)

   The forming processes and powder technology...forging, stamping, extrusion, rolling, drawing, tube making, compacting, and sintering are covered.

6. *Stainless Steels* (64-F)

   Austenitic, martensitic, and ferritic stainless steels are covered.

7. *Testing and Control* (64-G)

   Nondestructive testing...eddy current, fluid penetrant, magnetic, ultrasonic testing, and radiography are covered.

8. *Titanium* (64-H)

   Titanium metal/alloys/compounds...extractive, and physical metallurgy are discussed.

9. *Welding and Joining* (64-I)

All the welding processes including brazing, soldering, hardfacing, adhesive/diffusion bonding, and riveting are covered.

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Assuring Weld Quality

Hinkel, J.E. Cleveland, Ohio: Lincoln Electric Co., Sept. 1970, 20 pp.
(G410)..Free

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Distortion...How to Minimize it with Sound Design Practices and Controlled Welding Procedures plus Proven Methods for Straightening Distorted Members

Blodgett, O.W. Cleveland, Ohio: Lincoln Electric Co., Feb. 1972, 20 pp.
(G261)..Free

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Control of Distortion and Residual Stress in Weldments

American Society for Metals. Metals Park, Ohio: Author, 1977, 96 pp.
(25-C)..$12.50

This illustrated book contains five papers that were presented at an international conference held in 1976 that was co-sponsored by the American Society for Metals Joining Division and the *Welding Design and Fabrication* magazine.

Subjects:

Analysis of thermal stresses and metal movement during welding; Vibrational conditioning of castings and weldments; Elimination and correction of warpage in weldments; Control of distortion in nuclear weldments; and Residual stresses and stress-corrosion cracking in stainless steel weldments.

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Control of Distortion and Shrinkage in Welding

Masubuchi, K. New York, N.Y.: Welding Research Council, April 1970.
(149)..$2.00

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Design of Weldments - Volume I

Blodgett, O.W. Toronto, Ont.: Lincoln Electric Co. of Canada Ltd., 1963, 464 pp.
....$5.75

This reference handbook describes in detail the design techniques for creating machine designs in arc welded steel. Theoretical analysis, problem-solution examples and case history studies explain the designing of machine components for manufacturing economies and the improvement of product performance through the efficient use of steel's excellent physical properties. This book also includes eight sections dealing with "Weldesign".

Contents:

Load and Stress Analysis: Loads and their evaluation; Properties of materials; Properties of sections; Analysis of tension; Analysis of compression; Analysis of bending; Analysis of combined stresses; Strength of curved beams; Deflection by bending; Shear deflection in beams; Deflection of curved beams; and Buckling of plates. Special Design Conditions: Designing for impact loads; Designing for fatigue loads; Designing for improved vibration control; Dimensional stability; Elastic matching; and Designing for torsional loading.

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Elementary Metallurgy and Metalography

Shrager. Don Mills, Ont.: General Publishing Co. Ltd., 1975. Paper.
(DV 138)...$3.80

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La Fatigue des Assemblages Soudés

Granjon, H., & Newman, R.-P. 75880 Paris, CEDEX 18: Publications de la Soudure Autogène, 63 pp.

Précis des connaissances actuelles à l'usage du personnel enseignant et de bureaux d'études.

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Fatigue of Welded Structures

Gurney, T.R. New York, N.Y.: Cambridge University Press, 1968, xii + 294 pp. Cloth.
....$17.50

This book deals primarily with steel structures subjected to high cycle fatigue conditions and thereby covers the majority of the difficulties encountered in service.

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Fatigue of Welded Steel Structures

Munse, W.H. New York, N.Y.: Welding Research Council, 1964, 203 pp.
....$9.00

This is a reference book on the fundamental aspects of designing welded steel structures against cyclic loading. The influence of weld defects upon fatigue strength is discussed at a number of points in this book. A discussion of weld defects, their causes and methods of correction are briefly discussed in Chapter 5. Following this, information and data from many laboratory tests of welded structural members and connections are presented along with an analysis of these data.

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Handbook of Metal Treatments and Testing

Ross, R.B. New York, N.Y.: John Wiley and Sons Inc., 1977, 467 pp. (John Wiley and Sons Canada Ltd., Rexdale, Ont.)
....$35.00

Over 700 processes for the treatment and testing of metals are covered in this book. Each process of testing is described briefly with its purpose and applications.

Contents:

Adhesion testing processes; Alteration to properties: casting, forging, etc.; Blasting processes; Brazing and soldering; Build-up or additive processes; Cleaning treatments; Corrosion resisance, corrosion protection processes; Fatigue resistance improvement processes, Surface finish; Flaw and crack detection techniques; Friction improvement processes: forging and forming processes; Hardness treatments: increase in tensile strength; Heat treatments; Inspection processes; Joining techniques; Material removal process: mechanical testing; Metal working processes of methods; Painting processes; Plating processes; Softening treatments; Reduction in tensile strength; Strength testing processes; and Welding processes.

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L'influence du Soudage et des Soudures sur le Comportement à la Corrosion des Constructions

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18:
Auteur, 203 pp.

Sous ce titre, sont rassemblées les dix communications qui ont été présentées à la Séance publique de l'Assemblée annuelle de l'LLS à Tel-Aviv en juillet 1975. La première section, consacrée aux aciers inoxydables, comporte cinq communications. La deuxième section est consacrée aux aciers non alliés ou faiblement alliés et elle comporte quatre communications. Enfin, une communication est consacrée à la corrosion des ensembles soudés en Al/Zn/Mg. Huit contributions sont rédigées en anglais, deux en français. Elles sont toute précédées d'un résumé dans les deux langues.

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Metals Abstracts

American Society for Metals & The Metals Society. Metals Park, Ohio; London, England: Authors.

(62-A)	Basic Subscription	$480.00 Per Year
	University Rate	$288.00 Per Year

This monthly magazine is a comprehensive source for technical literature in the science and practice of metallurgy. The abstracts are re-collated within the following sections in the annual volume: (11) Constitution; (12) Crystal properties; (13) Lattice defects; (14) Structural hardening; (15) Physics of metals; (16) Irradiation effects; (21) Metalography; (22) Testing and control; (23) Analysis; (31) Mechanical properties; (32) Physical properties; (33) Electrical and magnetic phenomena; (34) Chemical and electro-chemical properties; (35) Corrosion; (41) Ores and raw materials; (42) Extraction and smelting; (43) Refining and purification; (44) Physical chemistry of extraction and refining; (45) Ferrous alloy production; (46) Non-ferrous alloy production; (51) Foundry; (52) Working; (53) Machining; (54) Powder technology; (55) Joining; (56) Thermal treatment; (57) Finishing; (58) Metallic coating; (61) Engineering components and structures; (62) Composites; (63) Electronic devices; (71) General and non-classified; and (72) Special publications.

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Metals Abstracts Index

American Society for Metals & The Metals Society. Metals Park, Ohio; London, England: Authors.
(62-B) Subscription................................$192.00 Per Year

This is a supplementary publication which simplifies the location of material in the *Metals Abstracts*. The Index, which is computer-generated, provides an author index and subject indexing using the American Society for Metals' *Thesaurus of Metallurgical Terms* for language control. "See" and "See Also" references simplify location.

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Metals Abstracts and Indexes

American Society for Metals & The Metals Society. Metals Park, Ohio; London, England: Authors.
(62-C) Nonsubscribers.............................$672.00 Per Year
Subscribers.................................$336.00 Per Year

At the end of each volume year, a bound volume of abstracts and indexes is available in hardcover. The abstracts are re-collated and re-imposed for the annual volume. The annual volume is sold as a five-book set containing all the abstracts published during the year, plus cumulated subject and author indexes.

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Metal Progress

American Society for Metals. Metals Park, Ohio: Author.
Subscription.......................................$22.50 Per Year
Single Copy Rates on Request

This monthly periodical is edited to inform technical people involved with: metallurgy, materials and process engineering, research and development, standards, procurement, and management. It also covers the essentials of technology and new developments in materials, processing, and fabrication. The major areas discussed are: Materials: iron and steel, non-ferrous metals, special metals and alloys, ceramics, and engineering plastics; Processing: heat treating, cleaning, finishing, coating, testing and inspection; Fabrication: welding and joining, forming, casting and powder metallurgy.

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Metallurgy

Johnson, C.G., Weeks, W.R., & Anderson, J.G. Chicago, Ill.: American Technical Society, 1977, 472 pp. 5th edition. (Copp Clark Publishing, Toronto, Ont.)

(3482-X)	$8.00
(3484-6)Student Guide	$2.50
(3485-4)Instructor's Guide (includes Answer Key)	$1.00

This new easy-to-read style edition is designed as a basic introductory text. Basic information about metallurgy is covered--how ferrous and non-ferrous metals behave and why. It defines terms, explains guiding principles and outlines manufacturing processes.

Contents:

Producing iron and steel; Refining into steel; Shaping and forming metals; Physical metallurgy; Mechanical properties; Testing of materials; Heat treatment; Surface treatment; Classification of steel; Cast iron; Welding metallurgy; Powder metallurgy; Producing non-ferrous metals; Light metals and alloys; and Copper and its alloys.

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Metallurgy and Materials Science Laboratory Manual

Allen, D.K., & Mortensen, K.S. Chicago, Ill.: American Technical Society, 1973, 218 pp. (Copp Clark Publishing, Toronto, Ont.)

(3650-4)	$7.00

This is an accompanying manual for the book entitled *Metallurgy Theory and Practice*. (see next page) The manual gives 22 planned experiments for both ferrous and non-ferrous metals including 7 for advanced study. The coverage is strictly in line with current and practical needs. All data recording sheets and experiment report forms are included.

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Metallurgy Theory and Practice

Allen, D.K. Chicago, Ill.: American Technical Society, 1976, 663 pp. (Copp Clark Publishing, Toronto, Ont.)

(3500-1)	$13.00
(3502-8)Student Guide	$2.30
(3503-6)Instructor's Answer Key	Free

This book introduces the student to both the theory and application of metallurgical principles as they are applied to the design, selection, heat treating, and processing of metals and alloys. The mechanical, physical, and chemical properties are covered. The principles of heat treatment and surface treatments are also covered in detail. Both ferrous and non-ferrous metals and alloys are studied. The metallurgical aspects of metal forming, molding, casting, welding, and machining are studied in detail.

Contents:

Property of metals; Material testing; Physical metallurgy; Constitution of alloys; The iron carbon diagram; Heat treatment for steel; Surface treatment for steel; Carbon and alloy steels; Plastic deformation of metals; Powder metallurgy; and Foundry, welding, machining metallurgy.

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Physics in Welding

Harris, W.J. Lake, Zurich, Ill.: Monticello Books, 1970, 64 pp. Paperback.
....$2.50

This book helps students understand the physics involved in welding, so that when reactions occur in the atomic structure of weld material, they can be controlled to assure strong and sound welds.

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Properties of Metals

Continuing Education Publications Division, Oregon State Department Department of Education. Portland, Oreg.: Author
(601-A)..$ .38

The above is a learning module.

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Recueil de Monographies sur les Ruptures par Fatique Survenues en Service dans les Constructions faisant appel au Soudage ou à la Précédés Connexes

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 288 pp., 355 figures et 25 tableaux.

Ce recueil qui contient une cinquantaine de monographies relatives à des cas de ruptures et à leurs causes présumées, est le résultat d'une enquête internationale sur la base d'un questionnaire et dont le but est de conduire au perfectionnement des constructions soudées et à en rendre l'utilisation aussi sûre sous sollicitations cycliques que sous sollicitations statiques.

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Weldability of Steels

Strout, R.D., & Doty, W.D-Orville. Troy, Ohio: Hobart School of Welding Technology, 430 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW441)..$15.00

This book contains extensive research on the weldability of steels.

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Welding Metallurgy - Volume I: Fundamentals

Linnert, G.E. Miami, Fla.: American Welding Society, 1965, 474 pp. (Canadian Welding Society, Weston, Ont.)
(WM1)..$16.50

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Welding Metallurgy - Volume II: Technology

Linnert, G.E. Miami, Fla.: American Welding Society, 1967, 674 pp. (Canadian Welding Society, Weston, Ont.)
(WM2)..$22.00

The above two texts, Volumes I and II, explain the welding processes and metallurgy.

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Welding Metallurgy of Stainless and Heat-Resisting Steels

Castro, R., de Cadenet, J.J., & Jain, R.C. New York, N.Y.: Cambridge University Press, 1975, x + 190 pp. Cloth. (ISBN 20431-3)..$16.95

Two French specialists survey the many aspects of welding alloy steels, including the choice of process and application of weldability tests. The text includes 68 plates, 11 tables and 43 line diagrams.

* * * *

Welding Technology

Koeningsberger, F., & Adair, J.R. Lake Zurich, Ill.: Monticello Books, 1966, 424 pp.
....$13.00

This text covers a wide range of subjects related to welding such as metallurgy, shop practices, etc. The chapters include many of the principles underlying the various processes.

* * * *

Weldment Distortion

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author, 12 pp.
....Free

This article was reprinted from the *Canadian Welder and Fabricator* magazine.

Contents:

Part I covers: Reasons for distortion; How properties of metals affect distortion; and Shrinkage control. Part II covers: Calculating shrinkage; and Examples of distortion control.

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Why do Welds Crack? How can Weld Cracks be Prevented?

Blodgett, O.W. Cleveland, Ohio: Lincoln Electric Co., April 1977, 8 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.) (G230)..Free

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XXV

METALLURGY
NON-PRINT MATERIALS

MÉTALLURGIE
MATÉRIEL NON IMPRIMÉ

BASIC PRINCIPLES

Basic Metallurgy: Part I

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC75-732996)

Colour/Sound Filmstrip (64 Frames). Time: 17:37 mins.

The origin and structure of the common materials which the average welder will encounter are explained and illustrated. Atomic structures are simplified and presented graphically, and elements, compounds and mixtures are explained. This filmstrip helps the student understand the structure of the irons and steels.

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BASIC PRINCIPLES

Basic Metallurgy: Part II

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC75-732997)

Colour/Sound Filmstrip (52 Frames). Time: 17:31 mins.

This filmstrip explains and illustrates the basic chemical, mechanical and cryogenic properties of materials and metals. Pitting, overall corrosion, transgranular stress corrosion, shear strength, tensile strength, and other pertinent material is presented. This will help the average craftsman choose the correct metal for the job.

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ELECTRIC ARC

Metallurgy: Electric Arc

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC75-732999)

Colour/Sound Filmstrip (75 Frames). Time: 19 mins.

Metallurgy is discussed as it applies to various electric welding processes. Problems which may be encountered with different types of steels and other materials are pointed out. The filmstrip explains or illustrates the types of welding which work best with low and mild carbon steels, heat treated carbon steels, medium and high carbon steels, low alloy steels, stainless steels, and cast iron. Among the processes included in this explanation are: Stick, MIG, TIG, Flux Cored Electrode, Submerged Arc, and Resistance Welding. Precautions related to metallurgy are included, which should be followed by the welder in order to ensure good quality welds.

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OXY-ACETYLENE

Metallurgy: Oxy-acetylene

Library Filmstrip Center, Wichita, Kans. (Niagara Publishers, Fenwick, Ont.)
(LC75-732998)

Colour/Sound Filmstrip (58 Frames). Time: 17:11 mins. 1974.

This filmstrip discusses and illustrates the physical properties of average weldable metals. Stress, strain, eleasticity, elastic limit, tensile strength, torsional strength, shear strength, and fatigue strength are among the factors included. Classification and identification of metals such as low carbon steel, high carbon steel, and the various alloys are included in this filmstrip. Spark and tempering characteristics are also described.

The previous four filmstrips are available in the following formats:

One colour/sound filmstrip with double-sided phonodisc	$28.00
One colour/sound filmstrip with audible signal cassette	$30.00
One colour/sound filmstrip with 5" reel (3-3/4" per second	$30.00

Recommended Levels: Secondary, College, Adult, Vocational

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DISTORTION

Prevention and Control of Distortion in Arc Welding

Lincoln Electric Co. of Canada Ltd., Toronto, Ont.

Purchase..$95.00
Free Rental

16mm Colour/Sound Motion Picture. Time: 20 mins.

This film shows the behaviour of metal subjected to heat, how to counteract shrinkage forces, use of prebending, proper welding sequences, plus additional information on the science of arc welding.

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XXVI

METALLURGY
PACKAGED COURSES

MÉTALLURGIE
COURS

ELEMENTS

Elements of Metallurgy, Course 1

Edelman, R.E. (Ed.), American Society for Metals, Metals Park, Ohio
(3 CEU) Complete Course.................................$172.50
Individual Lessons................................$6.00

This course is available in the form of a home-study course or an in-plant training course. All the lesson units are in a binder.

Home-Study Form: 15 Lessons/Lesson Tests/Final Exam/MEI Diploma

In Plant Training Form: 15 Lessons/1 Instructor's Course Operation Guide/Complimentary Copy of Set of Lessons for Instructor if Class Contains Five or More Students/Lesson Tests/Final Exam/MEI Diploma

This course is recommended as the first course for students requiring a basic understanding of metallurgical principles and terminology. With this foundation, any of the other courses may be taken.

Lessons:

Lesson 1: Atoms and Molecules

Common elements; Mixtures; Compounds; Atomic weights; Electron orbin arrangements

Lesson 2: The Elements of Physics

Measurements; Laws of conservation; Heat; Solids, liquids, and gases; Equilibrium

Lesson 3: The Elements of Chemistry

Chemical compounds; Molecular weights; Valances; Radicals; Solutions; Equations; Acids and bases

Lesson 4: Chemical Equilibrium, Heat and Temperature

Electromotive series; Reactions; Catalysis; Heat measurement; Emissivity

Lesson 5: Oxidation and Reduction (Extractive Metallurgy)

Combustion of fuels; Reactions with oxygen; Roasting of ores; Types of furnaces

Lesson 6: Smelting and Refractories

Smelting process; Blast, reverberatory, electric arc furnaces; Refractories

Lesson 7: Thermal Metal Refining

Refining processes; Types of furnaces; Advantages and disadvantages; Conversion of copper and nickel

Lesson 8: Electricity, Electrochemistry, and Electrolytic Processes

Underlying principles; Reactions; Refining and electroplating; Electrolysis

Lesson 9: Solidification of Metals

Atomic structures, crystal lattices; Pure metals; Commercial alloys; Solubility; Phase diagrams

Lesson 10: Solid Solutions

Atom movements; Properties of solutions; Types of solutions; Important alloys

Lesson 11: Heat Treatment of Steel

Process; Iron-cemenite diagram; Quenching; Hardenability; Stress relief

Lesson 12: Precipitation Hardening

Aging curves; Effects of aging; Influence of temperature; Fundamentals of precipitation hardening

Lesson 13: Diffusion and Surface Treatments

Diffusion factors; Nature of corrosion; Prevention; Surface treatments

Lesson 14: Methods of Forming Metals

Casting; Mechanical forming; Welding; Powder metallurgy

Lesson 15: Mechanical Testing of Metals

Destructive testing for hardness, fatigue strength, creep resistance; Nondestructive testing

Metals Handbook - Properties and Selection; Reference Guide

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FUNDAMENTALS

Fundamentals of Ferrous Metallurgy, Course 11

American Society for Metals, Metals Park, Ohio	
(3 CEU) Complete Course	$172.50
Individual Lessons	$6.00

This course is available in the form of a home-study course or an in-plant training course. All the lesson units are in a binder.

Home-Study Form: 15 Lessons/Lesson Tests/Final Exam/MEI Diploma

In-Plant Training Form: 15 Lessons/1 Instructor's Course Operation Guide/Complimentary Copy of Set of Lessons for Instructor if class contains five or more students/Lesson Tests/Final Exam/MEI Diploma

This course presents the important steps in steel making and treating.

Lessons:

Lesson 1: Blast Furnace Process

Construction; Operation; Chemical reactions and properties of the charge

Lesson 2: Open Hearth Operation

The plant; The furnace; Regenerative system; Melting and alloying practice; Acid open hearth process

Lesson 3: The Electric Furnace

Indirect arc; Direct arc; Induction; Reduction; Detailed discussion of plant operation

Lesson 4: Pneumatic Processes for Steel Making

Basic oxygen furnace and its operation; Rotary converters; Kaido process; Spray steel making process

Lesson 5: The Ingot Stage

Solidification; Structure including deoxidation practice; Defects; Molds

Lesson 6: Soaking Pits and Primary Mills

Soaking pit furnaces; Mechanical principles of rolling; Types of mills; Billet products; Bar products

Lesson 7: Flat Rolled Steel Products

Hot strip rolling; Cold rolling; Equipment and operations; Tin coating; Galvanizing; Terne plating

Lesson 8: Press Forging and Other Forming Methods

Large forgings; Hot and cold extrusion; Seamless and cold drawn tubes; New large presses

Lesson 9: Iron and Steel Founding

Melting, molding, and casting practices; Defects; Types and uses of iron castings

Lesson 10: Steel and Its Mechanical Properties

What is steel?; Properties; How these properties are measured and evaluated; Elasticity; Plasticity; Tensile testing; Effects of temperature

Lesson 11: Microstructure and Mechanical Properties

Structure and mechanical properties; Constitution of steel; Effect Effect of alloying elements and heat treatment; Transformation temperatures; Microstructural changes

Lesson 12: Austenite and Its Transformation

Relationship between structure of steel and its mechanical properties; Two basic methods of controlling structure; Classification; Nomenclature of steel

Lesson 13: Hardening of Steel

Proper hardening processes; Quenching; Hardening principles

Lesson 14: Surface Hardening

Flame, induction, and liquid salt hardening processes; Methods, reactions, and effects of carburizing; Discussion of miscellaneous surface hardening methods

Lesson 15: Failures and Defects Associated with Heat Treated Steel

Types of defects or failures; Cracking; Types and causes; Other defects such as distortion, soft spots, poor machinability.

Making, Shaping, and Treating of Steel; Reference Guide

GENERAL

Welding Metallurgy

Canadian Welding Development Institute, Toronto, Ont. $110.00

Case-bound volume of over 200 pages with 43 tables, 129 drawings and diagrams/Self-Evaluation Tests (Exercises)/Final Exam/Diploma

This home-study course has been developed assuming that the student has the knowledge of basic metallurgy, physics or chemistry. It starts simply and continues simply, but the end result is a thorough and practical understanding of welding metallurgy at all levels. Developing and setting welding procedures and sequences as they relate to heat input, retention and cooling are explained. The course teaches how to determine the hardenability and weldability of metals; how to calculate the carbon equivalent from the chemistry of a given steel and determine therefrom its degree of weldability; what precautions will be necessary; what preheat and postheat temperatures to specify and to determine if these have in fact been followed and that the desirable physical characteristics such as impact, ductility, grain size and corrosion resistance have been achieved. The Department of National Revenue allows the student to deduct the cost of the course from his taxable income.

Index and Synopsis of Table of Contents:

Lesson 1: Heat and Temperature in Welding

Equilibrium; Transmission of heat; Thermal conductivity; Measurement of temperature; Pyrometers; Units of heat; Heat by chemical reaction; Heat produced by electrical methods

Lesson 2: Welding Materials

Iron and steel production: open hearth, Bessemer oxygen, Kaldo; Ingot forms: killed, semi-killed, rimmed steel; Copper production: smelting, refining by furnace, refining by chemical methods; Aluminum and its alloys; Nickel production and uses

Lesson 3: The Welding Arc

Heat transfer, gas transfer, metal transfer, arc stability; Mechanism of droplet detachment; Chemical reactions of arc; Function of electrode coating; Coating characteristics

Lesson 4: Mechanical Properties

Tensile forces, stress, strain, Poisson's ratio, Young's modulus, calculation of stress due to strain caused by welding; Notch bar impact testing: charpy, V-notch; Fatigue testing; Creep testing.

Lesson 5: Properties of Metals

The atomic nature of matter; The phenomenon of allotrophy; Substitutional and interstitial solid solutions; Dilation; The solidification of metal; Grain structure effect; Shrinkage; Evolution of gases causing porosity; The weld as a small casting; Work orking of metals; Recrystallization; Hot and cold working; Preparation of weld specimens to be examined visually; Etching solutions to be used; The use of sulphur prints as a guide to the distribution of other impurities

Lesson 6: Alloy Systems

Solubility cooling curves; Thermal equilibrium diagrams; The lever rule; Calculations of phases present in an alloy

Lesson 7: Mechanical Properties of Alloys

Slip movement; Passage of a dislocation through a crystal; Grain boundary effects; Dispersion hardening; Mechanism of precipitation in alloys; Over-aging effects; Welding effects on heat-treatable aluminum alloys

Lesson 8: Iron Carbon Alloys

Iron, steels and cast irons; Introduction to the iron-carbon diagram; Eutectic and eutectoid reactions; Transformation temperatures; Hardening by quenching; Martensite formation; Annealing, normalizing, stress relieving; Grain refinement; Hypoeutectic cast iron; Production of nodular iron

Lesson 9: The Heat Treatment of Steel

Decomposition of austenite; Martensite transformation; Production of bainitic structure; Hardenability; Calculated hardenability from chemical analysis; Jominy end quench test; Factors affecting the TTT curve; Quench cracking

Lesson 10: Welding of Plain Carbon Steels

Gases dissolved in metals; Gas-metal compounds and reactions; Solubility of hydrogen in Austenite; Haloes or fish eyes; Cooling rate effect on ductility; Weld metal cracking; Effect of contraction stresses; Pick-up of undesirable elements.

Lesson 11: Welding Low-Alloy Steels

Hard zone cracking - (TTT) time, temperature, transormation curves; Hydrogen content of weld metal; Special alloy steels, maraging steels; Cracking tests; Controlled thermal severity

Lesson 12: Structure and Properties of Cast Iron

White cast iron; Grey cast iron; Malleable cast iron; Nodular cast iron; Classification of cast irons; Weldability of cast irons

Lesson 13: Metallurgy of Stainless Steels and Super Alloys

Stainless steel types: martensite, ferrite, austenite; Phenomenon of weld decay; Chromium-nickel-manganese steels; Sigma formation; Grain growth problems

Lesson 14: Metallurgy of Nonferrous Metals

Light alloys: aluminum copper alloy, aluminum alloys, precipitation hardening alloys, heat-treatable alloys, work hardening alloys; Classification of magnesium alloys; Effects of welding on heat-affected zone; Welding of magnesium alloys; Copper and nick nickel alloys: monel, high nickel base alloys, classes of copper; Work hardening of bronze; Metallurgy of joining copper base alloys alloys; Alloy segregation effects

Lesson 15: Reactive, Refractory Metals; Wear-Resisting Steels and Hard Facing

Metallurgy of titanium, including heat treatment; Absorption of gases; Embrittlement due to recrystallization; Hard surfacing, factors influencing wear; Hard facing alloy types: austenitic, martensitic, nonferrous alloys, carbide alloys

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INTRODUCTION

Introductory Welding Metallurgy

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)

Purchase of Complete Course	$105.00
Rental	$35.00
Text, 148 pp	$11.00
Instructor's Manual	$2.50

Text/Instructor's Manual/92 Slides

This course discusses the basic nature of metals and alloys and the properties which affect weldability.

Contents:

The welding processes; Introduction to metallurgy; Stresses: stress relief and annealing; Precipitation hardening and reactive metals; and Weldability of steel.

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METALLOGRAPHY

Welding Metallography

Metallurgical Services Laboratories Ltd., Surrey, England
(Micro-Metallurgical Ltd., Thornhill, Ont.)

Complete Course	$174.00
(A071) Handbook, 32 p.	$36.00
(A072) Slides	$138.00

Handbook/52 Mounted and Numbered 35mm Slides

The handbook was designed so that the pages, which consist of thin board laminated with plastic film, may be removed and used alongside the microscope. Each weld is fully reported, giving detailed descriptions and illustrations of each stage of the examination, macro- and micro-structures together with detailed specifications of each weld. The examination commentaries bring out the comparisons between the welds and processes. The handbook contains 50 photographs of macro- and micro-structures, averaging five per weld sample. An appendix is also provided which defines the various welding terms. In addition to the handbook, there is a set of slides of the 52 macro- and micro-structures to be found in the handbook. The slides are mounted between glass in 2" x 2" (50 x 50mm) slides and are numbered to conform with the illustrations in the handbook.

The Welds Provided Are:

1. Gas Weld of Mild Steel
2. Metal-Arc Weld of Mild Steel
3. Multi-Run Metal-Arc Weld of Mild Steel-As Welded
4. Multi-Run Metal-Arc Weld of Mild Steel-Normalized
5. Multi-Run Submerged Arc Weld of Mild Steel
6. Metal-Arc Fillet Weld in "40" Carbon Steel Without Preheat and with High Hydrogen Potential
7. Metal-Arc Fillet Weld in "40" Carbon Steel With Preheat and Low Hydrogen Potential
8. Tungsten Inert Gas Weld of Tough Pitch Copper
9. Gas Weld of Phosphorus Deoxidized Copper
10. Tungsten Inert Gas Weld of Phosphorus Deoxidized Copper

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WELDING AND JOINING

Metallurgy of Welding and Joining, Course 37

American Society for Metals, Metals Park, Ohio

(3 CEU) Complete Course	$172.50
Individual Lessons	$6.00

This course is available in the form of a home-study course or an in-plant training course. All the lesson units are in a binder.

Home-Study Form: 15 Lessons/Lesson Tests/Final Exam/MEI Diploma

In-Plant Training Form: 15 Lessons/1 Instructor's Course Operation Guide/Complimentary Copy of Set of Lessons for Instructor if class contains five or more students/Lesson Tests/Final Exam/ MEI Diploma

This is a composite course of selected lessons from *Arc Welding, Course 39* plus other lessons on resistance welding, electron beam welding, and oxy-acetylene processes.

Lessons:

Lesson 1: Survey of Joining Processes

Descriptions of welding of plastics, adhesive bonding, soldering, brazing, and major welding processes

Lesson 2: Welding Design

Types of joints, including butt, lap, tee, corner, edge, composite

Lesson 3: Weld Metal Soundness

Types of cracking; Tests for cracking; Metallographic examination; Restraint tests; Factors affecting weld cracking

Lesson 4: Carbon Steels

Metallurgical effects of welding; Effect of carbon; Transition temperature behaviour; Practical uses of carbon steels

Lesson 5: Low and Medium Alloy Steels

Comparison to carbon steel; Effect of preheat; Effect of postheat; Welding technique related to isothermal diagram

Lesson 6: High Alloy Steels - Fundamentals

Definitions; Specifications; High chromium alloy steels; Phase diagrams; Microstructure; Hardenability

Lesson 7: High Alloy Steels - Techniques

Welding techniques and procedures for martensitic stainless; ferritic stainless, austenitic stainless

Lesson 8: Copper and Its Alloys

Typical welding applications for copper, brass, bronze, and other copper alloys

Lesson 9: Aluminum, Magnesium, Titanium and Nickel

Typical welding applications for aluminum, magnesium, titanium, nickel, and their respective alloys

Lesson 10: Inspection of Weldments

Duties of an inspector; Imperfections in weldments; Discontinuities in weld metal; Inspection methods; Destructive testing of welds; Nondestructive inspection methods for welds

Lesson 11: Resistance Welding - Fundamentals

Basic laws of resistance welding; Types and properties of resistance welds; Joint designs; Processes

Lesson 12: Resistance Welding - Practice

Material specifications; Condition and thickness; Methods of cleaning; Electrode material, shape and size

Lesson 13: Electron Beam Welding

Penetration and nugget geometry; Operational modes; Equipment principles; Materials joined

Lesson 14: Fusion Welding of Steel

Sheet steel; Various techniques; Fusion welding of mild steel plate; Welding of steel pipe; Multiflame welding

Lesson 15: Improving Wear Resistance

Hard facing; Economies; Preparation; Lengthening the life; Rebuilding worn parts; Bronze surfacing

Metals Handbook - Welding and Brazing; Reference Guide

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XXVII

MATHEMATICS, BLUEPRINT READING, AND DESIGN PRINT MATERIALS

MATHÉMATIQUES, LECTURE DE BLEUS ET CONCEPTION MATÉRIEL IMPRIMÉ

Basic Electricity

Miller Electric Manufacturing Co. Appleton, Wis.: Author, 1954.
(EICO Canada Ltd., Weston, Ont.)
(0499-0017-4)..$1.00

Electricity is informally discussed as it applies to welding. The booklet is written in easy-to-understand language.

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Blueprint Reading for Welders

Bennett, A.E., & Sly, L.J. Albany, N.Y.: Delmar Publishers, Jan. 1978, 196 pp. 2nd edition. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)

....	$8.25
Instructor's Guide..	$1.60
Wall Charts...	$1.60

A complete introduction to the fundamentals of drawing interpretation as applied to the welding trade is provided. The first nine units cover fundamentals such as: basic lines and views; notes and specifications; structural shapes; and assembly drawing units. Subsequent units deal with welding symbols and their significance. This second edition includes new material on revolved projection and views, corrections and changes on prints, phantom and aligned sections, and the use of metrics in welding. Provided in the Appendix are charts for structural steel designations and metric conversion. The accompanying Instructor's Guide contains a time-allotment chart, a comprehensive review, and a listing of additional references. A packet of wall charts is also available to aid in visual classroom presentations.

Contents:

The purpose and makeup of prints; Basic lines: review drawing; jig support; Basic views: review drawing, test block; Notes and specifications: review drawing, corner bracket; Dimensions: review B drawing, roller support; Structural shapes: review B drawing, platform bracket holder; Review C drawing, landing bracket; Review D drawing, pump base; Review E drawing, skid type engine base; Other views: review B drawings, ornamental support post; Review C drawing, support arm; Sections: review A drawing, spring shackle; Review B drawing, gear blank; Detail and assembly prints: review drawing, adjustable bumper hitch details; General abbreviations and symbols; The welding symbol: review B drawing, cable drum; Welding abbreviations; Fillet welds; Groove welds; Back or backing and melt-thru welds; Plug and slot welds; Surfacing welds, flash or upset welds; Flange welds; Review.

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Blueprint Reading for Welders and Fitters

Hobart School of Welding Technology. Troy, Ohio: Author,
180 pp. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-459)..$6.00
(EW-460) Key for Tests..$1.00

Welders, fitters and set-up people learn to read prints and use fit-up tools. Basic fractions, decimal mathematics, and tests are included.

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Design for Welding: Some Practical Considerations in Designing Steel Weldments

Blodgett, O.W. Miami, Fla.: American Welding Society, 1968, 77
pp. (Canadian Welding Society, Weston, Ont.)
(DW)..$2.75

This booklet was developed for those interested in the design and fabrication of weldments. It focuses on a systems approach to weldments utilizing advanced design and fabrication techniques involving the efficient use of steel. Illustrations, examples, formulas, and nomographs are provided for purposes of clarification and practicality.

Contents:

The system approach to the efficient use of steel; What the designer needs to know; The design approach--part of whole; Designing for strength and rigidity; The design procedure; Redesign by equivalent section; The design of welded joints; Qualitative versus quantitative methods; Meeting a design problem; Potential sources of trouble; The overall view; and Identification of a design problem.

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Design of Welded Structures

Blodgett, O.W. Cleveland, Ohio: Lincoln Electric Co.,
832 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$7.50

The methods of designing with arc welded steel for buildings, bridges, towers, containers, and all types of miscellaneous structures are presented. These methods can be applied to the whole structure or its component parts. The book contains 966 drawings, 28 monographs, 163 tables, 190 charts, and 145 photographs. Seven "working" sections contain detailed analysis and practical examples that show how to create more efficient designs that can be fabricated more economically.

Contents:

Part I: Introduction to welded construction. Part II: Load and stress analysis - Properties of materials; Properties of sections; Built-up tension members; Analysis of bending; Deflection by bending; and Shear deflection in beams. Part III: Column-related design - Analysis of compression; Design of compression members; Column bases; Column splices; Bearing-pin connections; and Designing built-up columns. Part IV: Girder-related design - Welded plate girders for buildings; Shear attachments for composite construction - buildings; Shear attachments for composite construction - bridges; Floor systems for bridges; Orthotropic bridge decks; Fabrication of plate girders and cover-plated beams; Field welding of buildings; and Field welding of bridges. Part V: Beam-to-column connections; Flexible seat angles; Stiffened seat brackets; Web framing angles; Top connecting plates for simple beams and wind bracing; Top connecting plates for semi-rigid connections; Beam-to-column continuous connections; Beam-to-girder continuous connections; Design of trusses; Connections for tubular connections; Rigid-frame knees (elastic design); Welded connections for plastic design; and Welded connections for vierendeel trusses. Part VI: Miscellaneous structure design - Design of rigid frames (elastic design); Open web bar joists; Reinforcing bars; How to stiffen a panel; Tanks, bins and hoppers; and Design of hangers and supports. Part VII: Joint design and production-Selection of structural steel for welded construction; Weldability and welding procedure; Joint design; Determining weld size; Estimating welding cost; Welding on existing structures; Control of shrinkage and distortion; Painting and corrosion of welded structures; and Weld quality and inspection. Part VIII: Reference design formulas - Beam diagrams and formulas; and Torsion member diagrams and formulas.

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Design of Weldments

Blodgett, O.W. Cleveland, Ohio: Lincoln Electric, 1963, 425 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$5.75

This reference handbook describes in detail, the design techniques for creating machine designs in arc welded steel. Theoretical analysis, problem-solution examples, and case history studies explain how to design machine components for manufacturing economies and improvement of product performance through the efficient use of steel's excellent physical properties. Also included are eight sections dealing with "Weldesign".

Contents:

Part I: Load and stress analysis - Loads and their evaluation; Properties of materials; Properties of sections; Analysis of tension; Analysis of compression; Analysis of bending; Analysis of combined stresses; Strength of curved beams; Deflection by bending; Shear deflection in beams; Deflection of curved beams; and Buckling of plates. Part II: Special design conditions - Designing for impact loads; Designing for fatigue loads; Designing for improved vibration control; Dimensional stability; Elastic matching; and Designing for torsional loading. Part III: Stationary-member design - How to design machine bases; How to design flat tables; How to brace or stiffen a member; How to design steel frames; Columns, legs and feet; Flat containers, cylinders and shells; Design of container hangers and supports; How to design gear housings; Motors and generators; How to design bearing supports; How to design bosses and pads; and How to design machine brackets. Part IV: Rotating member design - How to design flywheels; How to design pulleys and sheaves; How to design steel rolls; and How to design large gears. Other subjects covered are: Design approach; Joint design and production; Reference design formulas; and Miscellaneous tables.

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How to Read Shop Drawings

Lincoln Electric Co. Cleveland, Ohio: Author, 1962, 200 pp.
(Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$3.50

This book provides a simplified approach to mastering the reading of shop drawings. It contains the latest information and application data on the American Welding Society's standard welding symbols. The book was designed as a self-teaching manual to enable students to better understand the design, engineering, and construction detailing. The "short-cut" language used by engineers and draftsmen to pass on assembly and welding information to the shop personnel is discussed in detail. Practical exercises and examples are provided to help the student develop the ability to visualize mechanically-drawn objects and as they will appear in their assembled form. There are over 100 illustrations in this book.

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Manual of Design for Arc Welding Steel Structures - ADE 896A

Airco Welding Products. Union, N.J.: Author, (8203-8003)..$3.00

Diagrams, tables, and data are used to illustrate the design of welded structural joints and connections.

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Metric Practice Guide for the Welding Industry

American Welding Society. Miami, Fla.: Author, 1975, 30 pp.
(Canadian Welding Society, Weston, Ont.)
(A2.3-75)..$5.50

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Metrics for Welding and Cutting

Cooper, G.S., & Magisos, J.H. (Eds.). Columbus, Ohio: Center for Vocational Education, Ohio State University, 1976, 59 pp.
....$3.50

This instructional package is designed to meet the job-related metric measurement needs of welding and cutting students. It is intended for students who already know the occupational terminology, measurement terms, and tools currently in use. Each of the five units in this package contains performance objectives, learning activities, and supporting information in the form of text, exercises, and tables. In addition, suggested teaching techniques are included. At the back of the package are objective-based evaluation items, a page of answers to the exercises and tests, a list of metric materials needed for the activities, references, and a list of suppliers. The material was designed to accommodate a variety of individual teaching and learning styles, e.g., independent study, small group, or whole-class activity. The exercises are intended to facilitate experiences with measurement instruments, tools, and devices used in this occupation and job-related tasks of estimating and measuring.

Contents:

Part I: General introduction to the metric system of measurement. Informal, hands-on experiences for the students are provided. This unit enables the students to become familiar with the basic metric units, their symbols, and measurement instruments; and to develop a set of mental references for metric values. The metric system of notation is also explained. Part II: provides the metric terms which are used in this occupation and gives experience with occupational measurement tasks. Part III: Focuses on job-related metric equivalents and their relationships. Part IV: Provides experience with recognizing and using metric instruments and tools in occupational measurement tasks. It also provides experience in comparing metric and customary measurement instruments. Part V: Designed to give students practice in converting customary and metric measurements.

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Practical Problems in Mathematics for Welders

Schell, F.R., & Matlock, B.J. Albany, N.Y.: Delmar Publishers, 1975, 168 pp. Softcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)

(0262-2)..	$6.75
(0263-0)..	$1.60

Practical problems are presented that give the student the opportunity to gain skills in applying mathematics principles to a wide range of situations encountered by welders on a day-to-day basis. Suitable for both vocational and academic use, the text offers a step-by-step, clear, concise approach to the mastery of basic math skills. The text can be used either in individualized programs or as a supplement to any comprehensive math workbook. Two Achievement Reviews at the end of the text provide a means of measuring student progress. The Instructor's Guide contains the solutions and answers to the problems in the text-workbook.

Contents:

Whole numbers; Common fractions; Decimal fractions; Linear measure; Angular measure; Surface measure; Volume measure, capacity, and weight; Averages and percentages; Pieces and lengths; Achievement Review A; Achievement Review B; and Appendix.

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Print Reading for Welders

Giachino, J.W., & Beukema, H.J. Chicago, Ill.: American Technical Society, 1978, 145 pp. Heavy paper cover spiral bound. (General Publishing Co. Ltd., Don Mills, Ont.)

(ATS/01)..	$7.40
Instructor's Answer Key....................................	Free

This text-workbook for class instruction or individualized study introduces welders to the ABC's of reading fabrication drawings. They will learn to understand fabrication drawings and the meaning of the American Welding Society's symbols. Later, they put it all together through the actual reading and interpretation of 22 fabrications type drawings.

Contents:

Threaded fasteners; Interpreting symbols; Welding symbols; Supplementary data; Machine terminology; Specifying weld sizes; Views and lines; Dimensioning; Print formats; Welding terms; and Fabrication prints.

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Symbols for Welding and Non-destructive Testing

American Welding Society. Miami, Fla.: Author, 1976, 70 pp.
(Canadian Welding Society, Weston, Ont.)
(A2.4-76)..$6.60

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XXVIII

MATHEMATICS, BLUEPRINT READING, AND DESIGN
NON-PRINT MATERIALS

MATHÉMATIQUES, LECTURE DE BLEUS ET CONCEPTION
MATÉRIEL NON IMPRIMÉ

BLUEPRINT READING

Blueprint Reading for Welders

Delmar Publishers, Albany, N.Y. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$1.60

Wall Charts.

These wall charts aid in visual classroom presentations.

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SYMBOLS

Welding Symbols

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)
(A2.1-76) Wall Size (22" x 28")............................$2.00
Desk Size (11" x 17")............................$ .75

Wall and Desk Charts. 1976.

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XXIX

MATHEMATICS, BLUEPRINT READING, AND DESIGN PACKAGED COURSES

MATHÉMATIQUES, LECTURE DE BLEUS ET CONCEPTION COURS

BLUEPRINT READING

Blueprint Reading for Welders and Fitters

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$350.00

Films/Instructor's Guide/Programmed Learning Package with 5 Written Tests/1 Symbols for Welding Learning Package/2 Written Tests/Answer Keys

The Instructor's Guide contains suggestions for teaching.

Contents:

Mathematics and metrics; Blueprint reading for welders and fitters; Tools and their uses; A set-up application.

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BLUEPRINT READING

Blueprint Reading - Welding Unit

Curriculum and Instructional Materials Center, Oklahoma State Department of Vocational and Technical Education, Stillwater, Okla.
....$2.50

Sound-Script/Self-tests/Unit Test

This is a programmed package designed to teaching the welding student the various welding symbols and other welding related information used on welding blueprints. The sound-script allows the teacher to program the unit on a cassette tape or sound pages.

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DESIGN

Welding Structural Design

Canadian Welding Development Institute, Toronto, Ont.
....$150.00

3 Volumes/Final Exam/Diploma

This home-study course is at an advanced level and is fully accredited by the Canadian Welding Bureau. Volume I is the Basic Text. Volume 2 supplies ready answers and simplifies the designer's work. It comprises 72 computer-developed tables and reference charts, sketches and realistic examples. Volume 3 is a supplementary study. The Department of National Revenue allows the student to deduct the cost of the course from his taxable income.

Index and Synopsis of Table of Contents

Volume I: Basic Text

Lesson 1: Materials

Making of steel; Selection of steel; Review of properties: yield, tensile, ductility, notch-toughness, fatigue, harderability, weldability; Factors affecting weldability; Carbon equivalent for weldability.

Lesson 2: General Design Recommendations

Type and size of joint; Joint geometry; Number and location of joints; Groove preparation; Residual stresses and distortion; Rigidity and continuity; Box sections; Fatigue; Brittle fracture; Cold plastic deformation; Direction of stresses; Choice of welding process; Type of steel.

Lesson 3: Fillet, Groove, Plug and Slot Welds

Stress analysis of welded joints; Fillet welds; Groove welds (complete and partial penetration); Slot and plug welds in: shear, tension, bending, torsion, tension and bending, tension and shear, shear and bending, shear and torsion.

Lesson 4: Flexible Connections

Framed beam connections; Flexible seated beam connections; Stiffened seated beam connections; Special flexible beam connections: direct beam-web connections, direct bearing connections, eccentric beam-web connection, offset beam to column connections, end-plate connections

Lesson 5: Moment Connections

Rigid connections; Cost factors in rigid beam-column connections; Semi-rigid connections; Welded top plate beam-column connections; Plastic design of connections; Typical elastic and plastic design: two-way and one-way beam to column connections, rigid frame knee connections.

Lesson 6: Welded Trusswork

Light section trusses; Stress Analysis of connections; Rolled section trusses; Tubular truss connections: welded tubular truss joints, fabrication considerations and corrosion aspects; Open-web steel joints

Lesson 7: Miscellaneous Structural Welded Design

Continuous Beams; Column Splices; Column bases: direct compression, direct load and moment, tubular columns, hollow rectangular columns, tee section columns; Reinforcement of web openings; Open-web expanded beams

Lesson 8: Welded Connections - Descriptive Reference

Moment connections; Trusswork; Rigid frame knee connections; Column bases; Reinforcing of rolled sections; Off-centre stiffeners; Latticed members; Filler plates; Gusset connections; Pin joint

Lesson 9: Welding Processes, Welding Procedures and Joints

Economic considerations of manual, semi- and fully-automatic applications; Comparison of processes; Welding procedures: electrodes and optimum welding conditions; Groove welded joints; Fillet welded joints; Plug and slot welds in lap joints; Review of economy and recommended applications

Lesson 10: Residual Stresses and Distortion

Residual stresses; Factors affecting the magnitude of distortion; Shrinkage; Transverse shrinkage in butt welds; Angular distortion in butt and fillet welds; Longitudinal shrinkage in fillet welds; Distortion control

Lesson 11: Fatigue and Brittle Fracture

Principal concepts and factors affecting fatigue: stress, material properties, rate of loading, residual stresses, rest periods, temperature, stress concentrations due to geometry; Practical applications of research data; Structural details; Summary of recommendations; Brittle fracture: basic concepts; Factors affecting brittle behaviour: chemical composition, steel mill practice, fabricating operations, service temperature, rate of strain, residual stresses.

Lesson 12: Welding Inspection

NDT: dye penetrant, magnetic particle, radiographic, ultrasonic, visual; Weld faults; Influence of defects on strength of welded joints: static loads, fatigue loads; Standard of acceptance; Recommendations.

Volume II: Reference Tables for *Design of Welded Structures*

Fillet welds; Groove welds; Flexible connections; Balanced design.

Volume III: *Design of Welded Structures*

Blodgett, O.W. Cleveland, Ohio: James F. Lincoln Arc Welding Foundation.

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MAINTENANCE FUNDAMENTALS

TPC Training Systems, Barrington, Ill. (Electrolab Inc., Belleville, Ont.)

Complete Unit	$22.50 Each
Supervisor's Manual Binder	$12.50
(9006) Tutor Cassette Program for #101	$155.00

10 Lessons/Supervisor's Instruction Guide (pre- and post-unit tests, answer sheets, automatic answer keys, progress charts, completion certificates)/Self-check Quizzes. Time: 20 Hrs. Each Unit.

This is not a correspondence course but a self-instructional course. The trainees proceed at their own pace. There are ten 16-page individually-bound lessons in a vinyl binder. Each lesson contains short segments of illustrated reading material followed immediately by questions or exercises. The trainees test themselves with self-check quizzes at the end of each lesson. At the end of each unit, they are given a multiple-choice End-of-Unit Test. The language used is simple and the illustrations are clear and to the point.

1. *Basic Blueprint Reading* (101)

   All types of blueprints found in industrial maintenance are covered. The unit shows how things look on a print and introduces the conventions used. Machine, building, electrical, piping, and sheetmetal drawings are included. The trainee is also shown how to sketch out ideas using techniques applied to engineering drawings.

2. *Reading Schematics and Symbols* (102)

   This unit shows the systems and how they work. It covers primarily electrical and fluid power diagrams, as well as welding symbols. An important first step to troubleshooting is provided. The unit teaches an understanding of how symbols are developed and what they mean. The symbols are then put together to form components, and finally, complete systems.

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XXX

MISCELLANEOUS
PRINT MATERIALS

DIVERS
MATÉRIEL IMPRIMÉ

Auto Body Repair

Instructional Materials Laboratory, University of Missouri-Columbia. Columbia, Mo.: Author, 1975, 208 pp.
(COE-6-S)..$7.50
(COE-6-K)..$2.00

Contents:

Introduction to auto body repair; Steel and automobile sheet metal components; Auto body tools and equipment; Auto body frame construction; Welding, shrinking and filling metal; Planning, estimating and measuring; Straightening and repair of frames; Panel straightening and repair; and Surface preparation and refinishing.

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Automotive Technology. Career Education Guide.

Directorate, U.S. Dependents Schools, European Area, Dept. of the Army. Washington, D.C.: Author, May 1974, 120 pp. Hardcover. (ERIC Document Reproduction Service, Arlington, Va.)
(ED 111 944)...$5.70

This curriculum guide was designed to provide students with realistic training in automotive technology theory and practice. The learning modules are grouped into three areas: small engines; automotive technology; and welding. Each unit plan consists of a description of the area under consideration, estimated hours of instruction, behavioural objectives, a module outline, a list of useful curriculum materials and resources, laboratory activites, and laboratory materials. The automotive occupations curriculum covers the topics of: basic small engine operation and construction, motorcycle repair; rotary engine power mechanics; marine engine repair; automobile operation and construction; basic tune-up; basic engine operation and construction; brake systems, power transmission systems, engine overhaul and repair; fuel system; electrical system; ignition systems; automotive parts, automotive maintenance; painting fundamentals; painting applications; body repair; welding; welding fundamentals; basic fusion and non-fusion processes; reading shop drawings; arc welding; gas welding; cutting; welding applications; and inert gas shielded-arc welding. The document concludes with facility layouts of functional auto mechanics, small engines, and welding laboratories.

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Basic Metalwork

Feirer, J.L., & Lindbeck, J.R. Peoria, Ill.: Chas. A. Bennett Co., Inc., 1978, 160 pp. (Copp Clark Publishing, Toronto, Ont.)

....$4.50

This introductory text explores the field of metalwork as a vocation with information on career opportunities. Good safety habits are emphasized.

Contents:

The mining and refining of metals; Principles of good design; Use of measuring and layout tools; Cutting and bending metal; Use of abrasives and grinders; Casting; Forging; Heat treatment; Metrics; Mass production; and Project ideas.

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Canadian Welder and Fabricator

Canadian Welder and Fabricator. Winnipeg, Man.: Author.
(Canadian Welding Society, Weston, Ont.)
Subscription...$10.00

This magazine is issued monthly.

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Catalogue de raccords de flexibles pour gaz cryogéniques liquéfiés

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1974, 86 pp.

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CM Certification Manual for Welding Inspectors

American Welding Society. Miami, Fla.: Author, 255 pp.
(Canadian Welding Society, Weston, Ont.)
(CM)..$29.00

Contents:

The welding inspector; Welding inspector responsibilities; Weldability; Welding metallurgy; Welding chemistry; Weld joint preparation; Discontinuities; Inspection processes; Welding inspector testing responsibilities; Welding processes; Codes, standards, and specifications; Welder qualifications and certification; The welding procedure and its qualification; Inspection reports: sample forms; Conversion tables; and Review questions.

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Diffusible Hydrogen in Mild Steel and Low-Alloy Steel Weld Metals: Test Method

Canadian Standards Association. Rexdale, Ont.: Author, 1977.
(W48.7-M1977)..$5.00

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Exploring Metalworking

Walker, J.R. South Holland, Ill.: Goodheart-Willcox Co., Inc., 272 pp. (General Publishing Co. Ltd., Don Mills, Ont.)
....$7.80
Workbook, 80 pp..$1.60

This introductory book teaches the fundamentals of working with metal, using both hand and power tools. It provides constructional details on carefully selected projects, alternate designs, and design variations which will help students create-design their own projects. The text is written in easy-to-understand language. There is a special insert printed in four colours to illustrate the major steelmaking processes. Students become acquainted with industry procedures and the career opportunities available. The workbook contains additional problems, projects and activities to help reinforce and enrich the instructional material in the text.

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Forging Design Handbook

American Society for Metals. Metals Park, Ohio: Author, 1972, 308 pp.
(25-C)...$27.00

Contents:

Material selection; Material control; Design problems involving parting line and grain flow; Design problems involving draft; Design problems involving ribs and bosses; Design problems involving corners and fillets; Design problems involving webs; Design problems involving cavities and holes; Design problems involving flash and trim; Dimensions and tolerances; Processes and equipment; Designing for overall economy; Directory of examples.

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General Metals

Feirer, J.L. Scarborough, Ont.: McGraw-Hill Ryerson Ltd.,

1976, 640 pp. 3rd Canadian Edition.
(82462-2)..$11.15

This book is fully metric in line with SI style and the latest standards available from CSA and industrial manufacturers. There is a special projects section as well as sections on careers and manufacturing. Students with no prior metalworking knowledge will be exposed to the field from the angle of industrialist, designer, employee, and hobbyist alike.

Contents:

Metalworking; Bench metal; Sheet metal; Art metal and jewellery; Metal finishing; Forging; Casting; Machining; Heat treating and materials testing; Fastening methods; Metals; Manufacturing metal products; and Projects.

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The History of Welding

Simonson, R.D. Lake Zurich, Ill.: Monticello Books, 1969, 208 pp.
....$5.00

The history of the metal joining processes--from the crude beginnings in Biblical times to the processes now finding application --is retraced, with emphasis on the past 75 years during which most of the development has taken place. All processes are discussed. The book is illustrated with many historical photographs from the early days of welding.

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How to Determine the Cost of Welding

Blodgett, O.W. Cleveland, Ohio: Lincoln Electric Co., Mar. 1977, 20 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.) (G610)

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Introduction to Modern Sheet Metal

Kratfel, E. Reston, Va.: Reston Publishing Co., Inc., 1976, 256 pp. (Prentice-Hall of Canada Ltd., Scarborough, Ont.)
(087909-395-1)...$16.25

This gives a basic and practical coverage of the world of sheet

metal products including artistic, prototype, and production items. A solid background is given in metals, their composition characteristics, forms, and applications.

Contents:

Metals; Metal forms; Basic hand tools; Basics of layout; Bench tools for shearing and punching; Bench tools for forming; Sheet metal seams; Joints and fasteners; Bonding by welding; Soldering; Brazing; Sheet metal finishing; Press forming; Drawing; Spinning; Embossing; Free Forming; and Work projects.

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Manuel pour l'examen par ultrasons des soudures

Commission V, Essais, Mesures et Contrôle des Soudures, l'Institut International de la Soudure. Paris, France: Auteur, 120 pp. (Publications de la Soudure Autogène, Paris, France.) (IIS/IIW 205-66)

Ce manuel décrit les techniques de contrôle se référant à des cas généraux et tient compte des différents documents, codes ou recommandations déjà existants. Il constitue en fait un code de bonne pratique pour l'examen par ultrasons des soudures, tant sur pièces planes que sur pièces courbes. En annexe on trouvera des spécifications concernant les caractéristiques des blocs d'étalonnage recommandés par l'I.I.S.

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Manuel pour le personnel ouvrier travaillant dans les usines de production d'acétylène et des gaz extraits de l'air

Publications de la Soudure Autogene. 75880 Paris, CEDEX 18: Auteur, 1973, 22 pp. Bilingue français/anglais.

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Manuel sur l'appareillage et les techniques de radiographie

Commission V, Essais, Mesures et Contrôle des Soudures, l'Institut International de la Soudure. Paris, France: Auteur, 138 pp. (Publications de la Soudure Autogène, Paris, France.)

Cet ouvrage fait le point des possibilités actuelles offertes par les équipements de radiographie aux rayons X et aux rayons

gamma et donne les directives de bonne pratique pour l'exécution correcte des radiographies d'assemblages soudés. Ce livre est à la fois un ouvrage technique contenant les notions théoriques nécessaires et un traité pratique indispensable au radiographe et au radiologue. Il est destiné à rendre les plus grands services dans les ateliers, sur les chantiers et partout où un contrôle radiographique est exécuté. C'est l'ouvrage de base de tout opérateur de prises de vues aux rayons X et gamma et tout contrôleur.

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Manufacturing Processes: Metals and Plastics

Johnson, H.V. Peoria. Ill.: Chas. A. Bennett Co., Inc., 1973. 576 pp. Hardcover. (Copp Clark Publishing, Toronto, Ont.) $22.75
Study Guide, 191 pp..$5.50

All the metal processes are covered. The opening section on occupations and safety contains a complete series of check points. The content is illustrated with up-to-date diagnostic photographs and drawings that help explain the complicated procedures. The book systematically covers materials, structure, machines, planning, operation, production sequences, and the relationships of all the divisions in production. There is an in-depth treatment of foundry and a section of the special casting processes. A unit on metrics is also included.

Contents:

Occupations in the metalworking industries; Safety; Producing and processing ferrous and nonferrous metals; Metallurgy and heat treatment of steel; Foundry processes; Special casting processes; Hot-working metal; Cold-working metal; Forming metal on presses; Measurements and instruments; Changing the shape of metals with machine tools; Machining metal with turning machines; Producing cylindrical holes; Machining metal with shapers and planers; Machining metal with milling machines; Sawing and filing; Broaching; Grinding and grinding machines; Screw threads; Gearing; Powder metallurgy; Polishing and finishing metals; Recent techniques in metalworking; Numerical control machining; Welding processes; and Plastics.

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MEMCO News

Miller Electric Manufacturing Co. Appleton, Wis.: Author. (Canadian Liquid Air, Bramalea, Ont.)

This bulletin which is published quarterly contains articles on Miller welders in action. It covers all Miller equipment and all the welding processes in on-the-job situations.

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Metal Forming I: Forging and Related Processes

Watkins, M.T. Don Mills, Ont.: Oxford University Press, 1976, 30 pp.
....$5.15

This book gives the product designed a synopsis of the processes available for the forming of materials, and an indication of the more important parameters which could either influence or be influenced by the design. A review of methods by which wrought bar can be converted into engineering products, included drop-forging, rotary-swaging and roll-forging techniques, cold and warm extrusion, upsetting, and forming from bar, tube, and wire.

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Metal Projects - Book I

Walker, J.R. South Holland, Ill.: Goodheart-Willcox Co., Inc., 112 pp. (General Publishing Co., Ltd., Don Mills, Ont.)
....$4.75

Contents:

Projects are presented for: Sheet metal; Machine shop; Bench metal; Foundry; Art metal; Welding; Forging. There is a total of 115 projects.

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Metals and How to Weld Them

Jefferson, T.B., & Woods, G. Cleveland, Ohio: James F. Lincoln Arc Welding Foundation, 1967. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$4.20

This reference book contains practical information for designing and making better welds at lower costs. It includes elementary information on metals, their mechanical and physical properties and their uses, complete with the fundamentals of metallurgy, the correct procedures for welding steels, cast iron, nonferrous materials and hardsurfacing. There are check lists included for good procedures, troubleshooting, cost estimating, and welding terms.

Contents:

What's this all about?; Mechanical properties of metals; Toughness and other properties; The metals we use; Nonferrous metals; Methods of welding; Fundamentals of metallurgy; Metallurgy and heat treating; Metallurgy and welding; Welding low-carbon steel; Welding medium-carbon steel; Welding high-carbon steel; Welding alloy steels; Welding cast iron; Stainless and high-chrome; Austenitic manganese steel; Welding nonferrous metals; Hardsurfacing; Welding tool and die steels; Welding the exotic metals; and Good welds and how to make them.

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Metals and Welding

Morford, V., Hoerner, T.A., and Anderson, A.W. St. Paul, Minn.: Hobar Publications, 1976, 230 pp.
(170)..$9.00

Contents:

Measuring instruments; Project planning; Metals; Planning the agri-business service center; Electricity; Classroom exercises; Work sheets; Laboratory jobs; and Metrics.

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Metals Handbook Volume V: Forging

American Society for Metals. Metals Park, Ohio: Author, 148 pp.
(19-A)...$25.00

The articles in this book cover forging and casting processes.

Contents:

Forging: hammers and presses for forging; selection of hammers and presses for forging; dies and die materials for hammer and press forging; open-die forging; closed-die forging; hot upset forging; roll forging; high energy rate forging; and ring rolling. Forging of: stainless steel; heat-resisting alloys; aluminum alloys; copper alloys; and magnesium alloys.

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Metals Handbook Volume 11: Nondestructive Inspection and Quality Control

American Society for Metals. Metals Park, Ohio: Author, 464 pp.
(22-A)..$52.00

The 33 articles contained in this volume give a broad range of techniques and procedures for the methods of nondestructive inspection and on the application of these methods to the control of quality in metal parts.

Partial Contents:

Methods of nondestructive inspection: 17 testing and inspection methods including hardness, liquid-penetrant, magnetic-particle, eddy-current, electromagnetic sorting, radiographic inspection by neutran radiography, ultrasonic, inspection by optical holography, inspection by acoustical holography, acoustic emission, microwave, thermal, leak testing, rapid identification of metals and alloys, spark testing of ferrous alloys, and chemical spot testing. Nondestructive inspection of specific types of metal products for evaluation of quality: forgings, castings, steel bars and billets, wrought tubular products, weldments, brazed assemblies, soldered joints, adhesive-bonded joints, threaded fasteners, pressure vessels and pipelines, powder metallurgy parts. Fundamentals of quality control and quality assurance, management considerations in nondestructive testing and quality control, quality concepts and statistical methods, quality assurance, quality control applications of nondestructive inspection, and reliability of flaw detection by nondestructive inspection.

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Metalwork

Feirer, J.L., & Lindbeck, J.R. Peoria, Ill.: Chas. A. Bennett Co.Inc.
1970, 248 pp. (Copp Clark Publishing, Toronto, Ont.)
....$6.00
Student's Guide...$2.00

This simple-to-use text teaching students about the metalworking industry. Students are encouraged to design, plan and carry through a product by learning basic hand and machine skills. Correlation is made to mathematics and sciences. There are many illustrated projects.

Contents:

Metals--their importance to you; Safety; Design; Drawing and sketching; Kinds of metals; Planning procedures; Measuring and marking out; Developing and transferring patterns; Cutting thin metal; Cutting heavy metal; Drilling; Filing; Cutting threads; Threaded fasteners; Bending sheet metal; Sheet-metal machines; Bending heavy metal; Cleaning and annealing metal; Forming metal; Planishing, fluting, doming, and overlaying; Tapping and chasing; Tooling; Etching; Enameling; Fastening sheet metal; Riveting; Soft soldering; Welding and brazing; Machining; Abrasives and grinders; Polishing and buffing; Colouring with heat and chemicals; Applying a finish; Combining tile, plastic, and other materials with metal; Metal casting; Forging; Heat treatment of steels; Mining and refining metals; Science in metalwork; Mathematics in metalwork; Occupations in metalwork; Modern industry in America; Planning a project for mass production; and Project ideas for metalwork.

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Metalworking Technology

Little, R. New York, N.Y.: McGraw-Hill International Book Co., 1977, 480 pp. (McGraw-Hill Ryerson Ltd., Scarborough, Ont.)
(38097-X)..$13.22
(38098-8) Instructor's Guide...........................In Press

This textbook was designed to serve metalworking and technology students. It covers the properties, fabrication, testing and machining of all materials related to the metalworking industries.

Contents:

Metals; Quality control; Hot metalworking; Cold metalworking; Welding processes; and Machine tools.

Recommended Levels: Community Colleges and Technical Institutes.

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Modern Metalworking

Walker, J.R. South Holland, Ill.: Goodheart-Willcox Co., Inc. 1976, 525 pp. (General Publishing Co., Ltd., Don Mills, Ont.)
....$11.60

Basic instruction on hand and machine tools and the materials and procedures used in the metalworking occupations is supplied. The major areas of our metalworking industries are introduced. The shaping and forming techniques applicable to space age metals such as chemical milling, powder metallurgy; electrical discharge machining, electron beam and inertial welding, chipless machining, numerical control, and quality control are also introduced.

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Modern Welded Structures Volume III

James F. Lincoln Arc Welding Foundation. Cleveland, Ohio: Author, 1970, 324 pp. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
....$4.50

100 case histories covering many different types of structures are illustrated with detailed engineering drawings, acutal installation photographs, and diagrams and formulas.

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Modern Welding

Althouse, A.D., Turnquist, C.H., & Bowditch, W.A. South Holland, Ill.: Goodheart-Willcox Co., Inc., 1976, 792 pp. (General Publishing Co., Ltd., Don Mills, Ont.)
....$9.00

The fundamentals of the various welding and cutting processes are explained in full colour. The book is arranged so the student may start welding experiences with any process. With this set-up, only a minimum amount of welding equipment is needed and all the equipment may be given maximum use. Each chapter contains a section on welding safety. The review questions cover the important points in the chapter.

Contents:

Properties of metals; Metal identification; Heat treatment; Metallurgy; Welding tools; Equipment; and Welder certification requirements.

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Painting Over Welds

Lincoln Electric Co. Cleveland, Ohio: Author, Jan. 1971, 1 p. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(G490)

Contents:

Problems; Causes; Relative effect of different electrodes and processes; Cures; and Summary.

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Practical Metal Projects

Ruley, M.J. Bloomington, Ill.: McKnight Publishing Co., 1970, 88 pp. Hardcover. (Van Nostrand Reinhold Ltd., Scarborough, Ont.)
....$7.95

These 38 projects are complete with photographs, procedure bills, and blueprints. Projects also included involve welding, as well as sheet and bench metalwork.

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Qualification Code for Welding Inspection Organizations

Canadian Standards Association. Rexdale, Ont.: Author, 1973. (W178-1973)..$5.50

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Recommandations pour l'installation de stockage d'oxygène liquide en vrac chez les utilisateurs.

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1972, 16 pp. Bilingue français/anglais.

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Riveting Concepts Which Combat Stress Failures

American Society for Metals. Metals Park, Ohio: Author, 1976. (TRS-76-64)..$10.00

This is a technical paper.

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The Science and Practice of Welding

Patton, W.J. Englewood Cliffs, N.J.: Prentice-Hall International, 1967, 524 pp. (Prentice-Hall of Canada Ltd., Scarborough, Ont.)

(013-795-62-4)..$17.00
Solutions Manual

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Spécifications pour les essais et le contrôle périodiques des bouteilles à gaz permanentes

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1971, 23 pp. Bilingue français/anglais.

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Standard Handbook of Fastening and Joining

Parmley, R.W. New York, N.Y.: McGraw-Hill International Book Co., 1977, 704 pp. (McGraw-Hill Ryerson Ltd., Scarborough, Ont.)
....$23.75

Contents:

Threaded fasteners and their standards; Standard pins; Retaining rings and spiral-wound retaining rings; Connections; Pipe fastenings and tube, pipe and hose connections; Metal, gas, braze, arc, and thermoplastic welding and their procedures; Lumber and timber connection; Structural steel connections; Locking components; Electrical connections; Adhesive bonding; Industrial riveting; Aerospace fastening and wire, rope, and cable fastening; Metric conversion; Tables to explain SI units.

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Stockage d'oxygène liquide en vrac dans les usines de production

Publications de la Soudure Autogène. 75880 Paris, CEDEX 18: Auteur, 1976, Trilingue français/anglais/allemand. (IGC Document 3/75)

Cette recommandation qui s'applique aux installations fixes de stockage d'oxygène liquide, fait le point sur les précautions à prendre pour le choix de l'emplacement de ces installations, leur conception et leur fonctionnement en vue de garantir la sécurité du personnel de service.

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Technical Metals

Johnson, H.V. Peoria, Ill.: Chas. A. Bennett Co., Inc., 1973, 476 pp.

(Copp Clark Publishing, Toronto, Ont.)
....$20.00
Student Workbook, 162 pp..................................$6.00

This book is intended for both beginners and experienced students in general metals. It is written in simple, clear language with step-by-step procedures. Students cover planning, safety, occupations, operational methods, tools, and measurement. Mathematics and science are correlated throughout. Each section is divided into units which cover basic tools, related information, materials, and processes. The various manipulative processes and principles of good design and consumer knowledge are explained. The book also contains detailed procedure drawings and many photo fill colour photographs. The Student Workbook helps the student reinforce the knowledge gained from the text by objective questions. Each unit in the workbook specifies which pages of the text it covers.

Contents:

Introduction to metalworking; Using bench tools; Wrought metal projects; Metal spinning and projects; Art metal and projects; Sheet metal and projects; Forging and projects; Foundry and projects; Welding and projects; Metal finishing; Heat treating and testing metals; Precision measurement; Machining metal and projects; Mathematics and science in metalworking; Chipless machining and controls; The metric system; and Metalworking tables.

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Total Auto Body Repair

Rhone, L.C. Indianapolis, Ind.: Howard W. Sams & Co., Inc., Publishers, 1976. (Lenbrook Industries Ltd., Scarborough, Ont.) (21031)..$16.00

All the areas of auto body repair are covered. The book can be used for self-study purposes. The sections and units are arranged so that each stands alone for quick reference. This book was designed to give sufficient practice in all phases of auto body repair skills. Over 1000 pictures and drawings illustrate the written material being explained.

Contents:

The body shop business (estimating, insurance, shop management); Hand and power tools (air compressors, painting equipment, shop equipment); Body fillers, abrasives, and sealers; Oxy-acetylene heating, brazing, heat-shrinking, welding; Arc welding; Auto body construction; Bumpers; Frame and body alignment; Metal straightening and aligning; Glass work; Trim work; Rust damage; Automotive paints and paint products; Preparing for painting; Applying automotive paint; and Paint rub-out and restoration.

Recommended Levels: High School Body Repair Courses, Vocational Schools, and Technical Schools

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The Total Welding Concept Simplified

Slusher, T. Houston, Tex.: Gulf Publishing Co., 1973, 74 pp.
Paperback. (Burns & MacEachern Ltd., Don Mills, Ont.)
....$7.00

This training guide will assist students in learning to perform the basic as well as the advanced tasks of the trade. Successful completion of these minimum tasks will provide fundamental knowledge, skills, and the techniques necessary to become a competent journeyman. Twenty-two tasks are defined. The requirements of each task are stated in each performance test. Students must complete all of the basic tasks and five advanced tasks. This program was designed to be self-pacing. Individuals should progress through the training guide at their own speed, which provides an opportunity for spending extra time on the less familiar and more difficult tasks. The system was designed to recognize the individual differences in the students' backgrounds and to provide learning reinforcement as required for each individual.

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Welder's Guide

Lincoln Electric Co. of Canada Ltd. Toronto, Ont.: Author,
April 1977, 14 pp.
(IM-237-C)

Contents:

Safety precautions; Learning to weld: basic welding instructions for the non-professional beginner welder; Using the carbon arc torch: instructions for heating metal, welding aluminum or copper and brazing with an arc torch; AC-225-S operating manual· includes safety, installation and operating instructions and a parts list; Selecting electrodes: brief descriptions of the types and operating data for all Lincoln electrodes; and Lincoln arc welders: brief descriptions of welders of most interest to non-professional welders.

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Welding and Other Joining Practices

Lindberg, R.A., & Braton, N.R. Toronto, Ont.: Allyn and Bacon Canada Ltd., 1976, 541 pp.
....$22.95

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Welding and the World of Metals

Miller Electric Manufacturing Co. Appleton, Wis.: Author.
(Canadian Liquid Air, Bramalea, Ont.)
....$ .50

This booklet gives a chronological account of metalworking from the Biblical times to the joining methods known today.

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Welding Fundamentals Manual

Dantrain. Greenville, S.C.: Author
(77A66740)...$20.50

This manual can be used as a stand-alone instructor's aid or can be easily incorporated into an existing program. All the units can be used in upgrade and/or entry level training. The manual was designed for the trainee who has had little or no previous welding experience.

Contents:

Weld and welding symbols; Welding processes; Welding terms; Gas torch cutting; Electrode types; and Welding safety and good housekeeping practices.

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Welding Helps Improve Productivity

American Society for Metals. Metals Park, Ohio: Author, 1976.
(TRS-76-51)..$10.00

This is a technical paper.

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Welding in the World

International Institute for Welding. London, England: Author.
(Canadian Welding Society, Weston, Ont.)
Subscription - One Year.................................$30.00

The subscriptions start in January each year. The magazine is published every two months.

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Welding Journal

American Welding Society. Miami, Fla.: Author. (Canadian
Welding Society, Weston, Ont.)
Subscription - One Year.................................$30.00
For 1977, 12 issues bound in one volume..................$35.00
Single copy...$2.00

The *Welding Journal* is published every month.

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Welding Process Manual

Airco Welding Products. Union, N.J.: Author,
(8242-0015)..$11.00

Contents:

Application data reports; Trade magazine articles/reprints; Technical papers; and Process information.

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Welding Process Technology

Houldcraft, P.T. New York, N.Y.: Cambridge University Press,
1977, 270 pp. Cloth.
(ISBN 21530-7)...$20.00

This text explains the many ways in which metal parts may be assembled by welding, the principles of operation, the main characteristics; and applications. The emphasis throughout is on how processes work.

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Welding Projects for School Shops

Hobart School of Welding Technology. Troy, Ohio: Author, 63 pp.
(Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-274)..$2.50

Contents:

Fifty project sheets for the school welding shop; Complete drawings; Pictures; Bills of materials; and the Tools required and instructions.

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Welding Terms and Definitions

American Welding Society. Miami, Fla.: Author, 1976, 80 pp.
(Canadian Welding Society, Weston, Ont.)
(A3.0-76)..$6.60

A comprehensive listing of the terms for brazing, soldering, thermal spraying, and thermal cutting is given.

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XXXI

MISCELLANEOUS
NON-PRINT MATERIALS

DIVERS
MATÉRIEL NON IMPRIMÉ

BENCH METALWORK

Bench Metalwork

RMI Educational Films, Inc., Kansas City, Mo.
(8115)..$25.00

Colour/Sound Filmstrip. 1971. Time: 25-30 mins. Available either with a record or a cassette

The basic skills of bench work are illustrated and explained. The procedures of cutting metal, filing, grinding, bending, twisting, drilling, and making threads are described. Attention is given to the shaping of the ends of the material; fastening pieces together by riveting; and the different finishing processes for metal.

Recommended Levels: Junior and Senior High School, and College Education

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BENCH METALWORK SERIES #505

The Forging Process

Bergwall Productions Inc., Garden City, N.Y. (Edu-Media Holdings Ltd., Kitchener, Ont.)
....$28.00

Filmstrip/Cassette/Instructor's Guide

The different types of forging furnaces used to heat metals to their proper temperature for forging into various shapes are shown. The use of protective clothing and the proper method of lighting a furance are emphasized. The techniques of bending, curving, shaping, and cutting are included.

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COST

Welding Cost Estimator

Lincoln Electric Co., Cleveland, Ohio. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(G607)

Black and White Chart. Aug. 1972.

This chart covers the labour and overhead costs only.

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FORGING

Modern Applications of Forge Welding

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
(301/C1)..$25.00

Regular 8mm/Super 8mm Silent Film

After establishing the heat and pressure amalgam, the spot, project, and seam welding processes are explored with emphasis on the significance of electrical resistance.

Recommended Levels: Secondary, Further, and Industrial Education.

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FUNDAMENTALS

Welding Fundamentals

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(S-63a)..$3.95

12-2" x 2" 35mm Slides

These slides show the welding techniques, types of welds, and welding positions.

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GOOD AND BAD WELDS

Examples of Good and Bad Welds

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros Canada Ltd., Woodstock, Ont.)
(DM-148)..$1.25

35" x 28" Wall Poster.

This poster is suitable for wall mounting.

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GOOD AND BAD WELDS

Good and Bad Welds

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(DM-325)...$6.00

10 Plastic Replicas

These replicas are for welding training use.

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HAND OPERATIONS - METALWORK SERIES

Riveting (9-656 A)
Blind Rivets (9-656 B)

Moreland-Latchford Productions Ltd., Toronto, Ont. (International Tele-Film Enterprises, Toronto, Ont.)
....$20.00 Each

Super 8mm Colour Film with Captions

Recommended Levels: Grades 7 and 8.

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JOINTS

Typical Welded Joints, Sections and Symbols

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(DM-153)...$1.25

35" x 28" Wall Poster.

This poster is suitable for wall mounting.

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METALWORKING SERIES

Sheet Metal Machines

Milliken Publishing Co., St. Louis, Mo. (Scholar's Choice, Stratford, Ont.)

(TDT43)..$10.00

16 Transparencies/12 Duplicating Masters

Contents:

Cutting tools; Nibbler; Beverly shears; Power and scroll shears; Common operation; Foot squaring shear; Combination notcher, copper and shear; Box and pan brake; Slip roll; Combination rotary machine; Adjustable bar folder; Spot welder; Duct project (pictorial-bill of materials); (Pittsburgh Lock section); (Double seam section); (Transition piece); (Pipe sections, clips); and Safety in the sheet metal shop.

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POSITIONS

Welding Positions

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(DM-151)..$1.25

35" x 28" Wall Poster

This poster is suitable for wall mounting.

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PROCESS SELECTION

Process Selection Chart

Lincoln Electric Co., Cleveland, Ohio. (Lincoln Electric Co. of Canada Ltd., Toronto, Ont.)
(G120.1)

Black and White 8-1/2" x 11" chart punched for a three-ring binder.

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RIVETING AND BOLTING SERIES

Cold Riveting (302/C1)
Blind Riveting (302/C2)
Using Bolts (302/C3)
Bolt Heads (302/C4)

Bolt Shanks (302/C5)
Washers (302/C6)
Thread Helical Forms (302/C7)
Thread Section Forms (302/C8)
Thread Cutting by Machine (302/C9)
Thread Cutting by Hand (External) (302/C10)
Thread Cutting by Hand (Internal) (302/C11)

Eothen Films Ltd., Herts, England. (Pace Educational Media, Orange, Calif.)
....$24.00 Each

Regular 8mm/Super 8mm Silent Films

Live action filming supported by animation is used to demonstrate the correct techniques of riveting and bolting, the care of tools, and to explain the principles and concepts. The characteristics of the main thread forms are explained. The correct safety practice is emphasized throughout the series which has been designed for industrial arts courses, vocational training establishments; meeting the needs of craft students in schools; and home-workshop enthusiasts.

Recommended Levels: Secondary School, further, and Industrial Education.

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SHEET METAL

Sheet Metalwork

RMI Educational Films, Inc., Kansas City, Mo.
(8117)..$25.00

Colour/Sound Filmstrip. 1971. Available either with a record or a cassette.

This filmstrip instructs by developing the procedures of making a project and giving meaning to such techniques of pattern as: layout; cutting sheet material; bending; making hems, seams and joints; also fastening sheet metal by using rivets. screws, spot weld, and soft solder. The hand tools used in sheet metalwork are introduced as well as the bench anvils, squaring shear, box and pan brake, and the roll forming machine.

Recommended Levels: Junior and Senior High School, and College Education.

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SHEET METAL BASICS SERIES - GROUP II FASTENERS

DCA Educational Products, Warrington, Penna. (Brodhead Garrett, Cleveland, Ohio)

Instructional Multicoloured Transparencies

1.	*Types of Seams - 1* (124163 SHB-3)	$4.10
2.	*Types of Seams - 2* (124174 SHB-4)	$4.10
3.	*How to Make Seams - 1* (124185 SHB-5)	$4.80
4.	*How to Make Seams - 2* (124196 SHB-6)	$4.80
5.	*How to Make Seams - 3* (124203 SHB-7)	$4.80
6.	*Dovetail Seams* (124214 SHB-8)	$4.80
7.	*Nails, Nuts and Bolts* (124225 SHB-9)	$4.10
8.	*Screws - 1* (124236 SHB-10)	$4.10
9.	*Screws - 2* (124247 SHB-11)	$4.10
10.	*Rivets* (124258 SHB-12)	$4.10
11.	*Rivets, Assembly* (124269 SHB-13)	$4.80
12.	*Rivets, Assembly, Rivet Set* (124270 SHB-14)	$4.80
13.	*Rivets, Assembly, Blind* (124280 SHB-15)	$4.80
14.	*Rivets, Removal* (124291 SHB-16)	$4.80

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SHEET METAL FABRICATION SERIES - UNIT 3

Changing the End of a Rectangle to a Semi-Circle
Circular Cutting with Snips
Spot Welding a Seam

DCA Educational Products, Warrington, Penna. (Career Aids, Inc., N. Hollywood, Calif.)
(DCA-SHF3)...$50.00

3 Filmstrips/3 Cassettes/Work Sheets/Guide

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SHEET METALWORK SERIES

Riveting and Fastening

Jam Handy Organization, Detroit, Mich. (Prentice-Hall of Canada, Ltd., Scarborough, Ont.)
(KD 934) Filmstrip.....................................$17.25
Cassette.....................................$12.65

Colour Filmstrip/Cassette/Instructor's Guide

The basic procedures, safety precautions, and the correct use of the tools to carry out the basic operations are introduced.

Contents:

The correct rivet is chosen from a variety of sets; Clinching; Riveting in a blind spot; Cutting rivets to the proper size; and Using a split rivet for a switch.

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TESTING

Mechanical Testing of Welds

Continuing Education Publications Division, Oregon State Department of Education, Portland, Oreg.
....$11.76

Slide/Tape

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TROUBLES

Causes and Cures of Common Welding Troubles

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(DM-152)..$1.25

35" x 28" Wall Poster.

This poster is suitable for wall mounting.

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TYPES OF WELDS

Types of Welds

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
(EW-272)..$1.25

35" x 282 Wall Poster.

This poster is suitable for wall mounting.

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XXXII

MISCELLANEOUS
PACKAGED COURSES

DIVERS
COURS

ELECTRIC ARC

Electric Arc Welding, Terms and Types

Dorsett Educational Systems, Inc., Norman, Okla.
(Oa13) With Filmstrip....................................$17.50
With Slides.......................................$20.00

Filmstrip/One Side of an Audio Cassette/Reference Folder/Progress Check Tests

The lesson requires about 20 to 30 minutes including responses and post-testing time. It is paced rapidly and is intended to be repeated for thorough learning. The Progress Check Tests for pre- and post-testing are printed on computer-card size sheets and may be graded quickly by a masked plastic overlay. The Reference Folders contain the entire audio script, plus the multiple-choice responses from the filmstrip.

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FASTENING AND JOINING

Basic Fastening and Joining Techniques

American Society for Metals, Metals Park, Ohio
(57-F)...$15.00

This programmed learning course introduces the student to the fastening and joining techniques.

Contents:

The fundamentals of riveted and bolted joints; Commonly used threaded fasteners such as screws, studs, locking fasteners, single-thread fasteners, nuts, inserts, and welded fasteners; Commonly used nonthreaded fasteners such as pins and retaining rings; Retaining devices such as setscrews and washers; Special purpose fasteners as spring clips and quick operation fasteners; Fusion processes such as welding, brazing, and soldering; and Adhesive bonding.

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FUNDAMENTALS

Welding Fundamental Principles and Practices

Canadian Welding Development Institute, Toronto, Ont.

....$110.00

Textbooks/22 Self-Evaluation Tests (Exercises)/Final Exam/ Diploma

This home-study course is fully accredited by the Canadian Welding Bureau. It is also accepted by the Ontario Association of Certified Engineering Technicians and Technologists as an allowable Level I credit for Welding Practice. The Department of National Revenue allows students to deduct the cost of the course from their taxable income.

Index and Synposis of Table of Contents:

Lesson 1: Basic Joints and Weld Types

Five basic joints; Three basic welds; Continuous and intermittent welds; Positions of welds; Groove, fillet, and plug welds.

Lesson 2: Blueprint Reading and Standard Welding Symbols

Blueprint reading: Description of shape; Reading the drawing; Dimensions; Views; Cross-sections; The use of lines. Welding Symbols: Basic types of joints; Fillet welds; Groove welds; Back or backing welds; Use of symbols for machine, marine, and structural drawings; General table of symbols.

Lesson 3: Arc Welding Processes

Direct and indirect arc: DC and AC arc; Polarity; Arc shielding; Manual metal arc welding; Atomic hydrogen welding; Carbon arc welding; Gas tungsten arc welding (T.I.G.); Plasma arc welding; Semi-automatic processes; Gas metal arc welding (M.I.G.); Dip transfer; Continuous wire; CO_2 shielding; Flux-cored wire; Automatic processes; Submerged arc; Coated wire; Continuous wire with CO_2; M.I.G. and T.I.G.; Electroslag; Electrogas: Special welding processes.

Lesson 4: Arc Welding Equipment

DC variable voltage motor generator sets; AC transformer and DC rectifier-type welding machines: Combination AC-DC. constant voltage and constant current welding machines. Fundamental electricity, volts, amperes, ohms, kilowatts, etc.

Lesson 5: Arc Welding Electrodes

Mild steel; Low-alloy; Corrosion-resisting chromium and chromium-nickel steel; Surfacing, ferrous and non-ferrous; Nickel and nickel-alloy; Aluminum and aluminum-alloy; Copper and copper-alloy; Dipped electrodes; Light-, medium- and heavy-coated electrodes; Low-alloy steel electrodes, etc.

Lesson 6: The Preparation of Joints for Arc Welding

Edge preparation; Mechnical cutting, machining; Flame or gas cutting, gouging; Plasma arc cutting; Special cutting applications; Stainless steel and non-ferrous metals cutting.

Lesson 7: Health and Safety Precautions

Gas cylinders; Acetylene generators; Gas welding and cutting equipment; Arc welding equipment; Operator protection.

Lesson 8: Welding Metallurgy

Material composition and its effect on weldability; Iron, steel and alloys; Rimmed, semi-killed and killed steel; Carbon, manganese, phosphorus, solphur and silicon in steel; Cast irons; Stainless steels; Alloys.

Lesson 9: Welding Metallurgy

The effect of welding and associated treatment on material and weld properties; Heat treatment: stress relieving, annealing, normalizing, hardening, tempering or drawing; Preheat and postheat; Austenite, pearlite, martensite, etc; Weldability of steels and non-ferrous metals.

Lesson 10: Welding Metallurgy

Material specification; Plate and sheet steels; SAE and AISI steel

Material specification; Plate and sheet steels; SAE and AISI steel identification; CSA, ASTM and ASME specifications; Stainless steel specifications.

Lesson 11: Welding Distortion and Residual Stresses

Expansion, contraction, stress; Transverse, angular and longitudinal distortion; Uniformity of heat input; Distortion control; Plates and stiffeners; Peening; Shrinkage allowances; Distortion prevention precautions; Residual stresses.

Lesson 12: Weld Faults, Inspection and Testing

Dimensional defects, warping, incorrect preparation and fit-up weld size and profile; Overlap; Convexity, concavity and reinforcement; Structural discontinuities, porosity, blowholes; piping; lack of fusion, incomplete penetration; Undercut, nonmetallic inclusions; Cracking, spatter, etc.; Welding procedure standards; Inspection; Nondestructive testing: visual, radiographic, ultrasonic, magnetic particle, liquid penetrant and proof tests; Destructive testing: tensile, bend, fracture, impact, hardness, sectioning, metallographic, corrosion and chemical analysis tests; Welding inspector qualification.

Lesson 13: Design and Workmanship

Static, impact, fatigue loads; Stresses; Strain; Strength, elasticity, ductility, weldability, notch toughness; Safety; Selection of steel; Joint design, groove, fillet, plug and slot welds; Tack and temporary welds; Codes; Welds in combination with bolts and rivets; Accessibility; Fatigue, brittle fracture; Summation for designers, shop and field supervisors.

Lesson 14: Codes, Specifications and Standards

CSA Certification Standard W47.1 (qualification of engineering and supervisory personnel, fabricator, contractor and operating personnel), fabricator's welding standards; CSA W59.1 (specification for welding of steel structures); Series of electrode standards CSA W186 (reinforcing bars); CSA W55.3 (resistance welding); CSA W47.2 (Aluminum welding qualification code); CSA W178 (inspection); and CSA G40.21 (structural quality steels); Procedure and operator qualification; Listing of foreign and domestic codes.

Lesson 15: Production Methods and Economies

The cost of a weldment; Positioning, size, type of electrode, preparation and fit-up; Weld quality; Shop layout; Material handling (manipulators, jigs, positioners, fixtures); Operator comfort; Shop equipment; Estimating (facts to consider).

Lesson 16: Supervision and Foremanship

Qualification of a supervisor and foreman; The line of authority; What lies ahead?; Line worker, foreman, management; Why good foremen and operators are always in demand; Effective training; Clarity in communication.

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INSPECTION AND QUALITY ASSURANCE

Welding Inspection and Quality Assurance

American Welding Society, Miami, Fla. (Canadian Welding Society, Weston, Ont.)

Complete Course: Purchase	$105.00
Rental:	$35.00
Text	$11.00
Instructor's Manual	$2.50

1 - 248-p. *Welding Inspection* text/Instructor's Manual/156 Slides

All the requirements for the inspection and qualification of welders are discussed.

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METALWORK AND HYDRAULICS

Metal Removal and Hydraulics Job Training

Hill, G.M., & Associates, Howard W. Sams & Co., Inc., Indianapolis, Minn. (Lenbrook Industries Ltd., Scarborough, Ont.)
....$1600.00

35mm Slides in a Carousal Tray/Posters/Student handout booklets/Instructor's Manual/Instructor's Guide/20 Student Reference Texts in 3-Ring Vinyl Binders/20 Quiz/Test Sets with Answer Sheets

This industry-developed system was designed to offer a complete metalworking and hydraulics program. The program is presented simply and is concerned with actual shop practices.

Contents:

Principles of correct metal removal; Practices of correct metal removal; Hydraulic principles; Principles of numerical control; and Semi-autommatic CO_2 shielded metal arc welding.

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QUALITY AND INSPECTION

Weld Quality and Inspection Course 35

American Society for Metals, Metals Park, Ohio, and American Welding Society, Miami, Fla.
(3 CEU)..$172.50

This course was designed as an aid to qualification and certification.-

Lesson 1: Elements of Physics

Measurements; Laws of conservation; Heat; Solids, liquids and gases; Equilibrium

Lesson 2: Mechanical Testing of Metals

Destructive testing for hardness, fatigue strength, creep resistance; Nondestructive testing.

Lesson 3: Survey of Joining Processes

Descriptions of welding of plastics, adhesive bonding, soldering, brazing, and major welding processes.

Lesson 4: Arc Welding Consumables and Power Supplies

Functions of electrode coatings and fluxes; Welding electrodes, wires and rods; Shielding gases; Alternating and direct-current power sources.

Lesson 5: Fundamentals of Arc Welding

Principles of operation; Effect of welding current; Arc blow; Metal transfer modes; Metallurgy of welded joint; Preheating

Lesson 6: Mechanical Properties

Hardness-tensile strength; Impact strength; Fatigue strength; Bendability; Properties of weld metal

Lesson 7: Welding Design
Types of joints, including butt, lap, tee, corner and edge; Welding symbols; Notch-effects and stress distribution; Details of good design.

Lesson 8: Weld Metal Soundness

Types of cracking; Tests for cracking; Metallographic examination; Restraint tests; Factors affecting weld cracking.

Lesson 9: Carbon Steels

Metallurgical effects of welding; Effect of carbon transition temperature behavior; Practical uses of carbon steel

Lesson 10: Low and Medium Alloy Steels

Comparison to carbon steel; Effect of preheat; Effect of postheat; Welding technique related to isothermal diagram

Lesson 11: High Alloy Steels: Techniques

Welding techniques and procedures for martensitic, ferritic and austenitic stainless steels

Lesson 12: Inspection of weldments

Duties of an inspector; Imperfections in weldments; Discontinuities in weld metal; Inspection methods; Destructive testing of welds; Nondestructive inspection methods for welds

Lesson 13: Weldability

Importance of and factors affecting weldability; Direct and indirect weldability tests; Present status of weldability

Metals Handbook - Welding and Brazing; Reference Guide

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QUALITY CONTROL AND INSPECTION

Weld Quality Control and Inspection

Canadian Welding Development Institute, Toronto, Ont. $150.00

15 Handbooks with Exercises/Official Answers/Final Exam/Diploma

This home-study course covers most aspects of the modern inspection methods and quality control procedures. The official answers for checking and comparison will be sent upon submission of each exercise. The course covers the essentials for a welding inspector, the principles of inspection, and the practical features of visual, mechanical and nondestructive testing methods. Also explained are weld faults and defects--how they happen--how they can be detected--how they can be avoided--how they can be corrected and whether they should be corrected. The Department of National Revenue allows students to deduct the cost of the course from their taxable income.

Index and Synopsis of Table of Contents

Lesson 1: Basic Concepts of Quality Control and Inspection

Introduction, aims of the lesson; Elements of a quality control system, policy, integration, requirements; Outline of a quality control system, objectives, organization, procedures, records; Role of the welding inspector; Inspection in action, plan, review of specification and manufacturing procedures, types of inspection, sequence, repair work, results, records and reports; Benefits; References.

Lesson 2: Survey of Weld Testing

Introduction; Destructive tests, tensile, root bead, face bend, impact, nick-break, hardness tests, sectioning, macro- and micro-examination; Nondestructive tests, visual inspection, radiography, ultrasonic, magnetic particle, liquid penetrant inspection, leak testing, proof testing; Chemical inspection, analysis, types; Relative costs; Comparison; Specifications and Standards for nondestructive testing

Lesson 3: Visual Inspection of Welds

Prior inspection, design and materials; In-process inspection, edge preparation, rolling or bending, assembly, welding; Final inspection; Rejection and repairs

Lesson 4: Factors Affecting Weld Quality

Personnel: engineering, supervision, welding staff; Design; Fixtures; Base materials; Welding materials (consumables) and their classification, electrode coatings, precautions and certification; Welding procedures; Processes and equipment; Inspection; Welding of CSA G40.21 steels; Preheating guide for structural steels; Bibliography

Lesson 5: Arc Weld Faults

Dimensional faults: warping, incorrect preparation and fit-up, size, profile; Structural discontinuities: porosity, lack of fusion, penetration, undercut, includions, cracks, surface irregularities; Deficient mechanical properties or composition; Summary of weld faults; Need for procedure standards; Allowable defect limits (CSA and other codes); Limits when No Code Applied; References.

Lesson 6: Mechanical Inspection and Testing of Welds

What are test plates?; Tensile tests, types and machines; Bend tests; Nick-break tests; Hardness tests; Proof tests; Fatigue tests; Impact tests; Temperature tests; Drift tests; Sectioning tests; Weldability tests.

Lesson 7: Liquid Penetrant Inspection

Classes of penetrants; Types of developers; Equipment; The penetrant inspection process; The need for cleaning; Types of cleaning; Application of penetrant; Application of emulsifier; Removal of penetrant; Application of developer; Drying; Viewing; Interpretation; Leak detection; Safety precautions; Advantages and disadvantages of liquid penetrant testing

Lesson 8: Chemical and Metallographic Inspection

Chemical analysis, segregation, spark test, spectroscope, spot test, corrosion resistance; Metallographic examination, macro-, micro-examination, metallurgical laboratory

Lesson 9: Magnetic Particle Testing

Magnetic fields; Sources of magnetization; Capabilities of the test; Magnetic field strength; Properties of the indicating medium; Testing techniques; Standards and specifications, evaluation of indications, acceptance standards

Lesson 10: Radiographic Inspection - Part I

Introduction; Principles of radiography, X-rays, gamma rays, Radiation; Film data; Accessories; Exposure; Film processing, equipment, processing, viewing conditions; Sensitivity; Penetrameter requirements (ASME Sec.III); Interpretation of weld radiographs; Inspection records; Acceptance standards; Reference radiographs; Limitations; Radiation hazards control; Protection methods; Canadian regulations for dealing with radioisotopes; Definitions of units for measuring radiation exposure.

Lesson 11: Radiographic Inspection - Part II

Canadian Government Specification Board; Certification of industrial radiographers (48-GP-4a); Manual on industrial radiography (48-GP-5); ASME boiler and pressure vessel code, section V (nondestructive examination); Section VIII, Div. 2, Part A1 (inspection and radiography), porosity charts; American Welding Society D1.1 (Structural Welding Code).

Lesson 12: Ultrasonic Inspection - Part I

Introduction; Basic concepts, sound, sound wave, wave length, velocity-frequency relationship; Sonic testing; Generation of ultrasound; Instrumentation for ultrasound; Wave modes; Characteristics of sound beam; Calibration; Weld testing; Standards and specifications; Comparison with other NDT systems; Bibliography

Lesson 13: Ultrasonic Inspection - Part II

Canadian Government Specification Board; Recommended practices (48-GP-6a); Certification of nondestructive testing personnel (ultrasonic category, 48-GP-7a); ASME boiler and pressure vessel code, section V (nondestructive examination), Section VIII, Div. 1, appendix 11 (ultrasonic examination of welds; American Welding Society D1.1 (Structural Welding Code (Part III, ultrasonic testing of groove welds)

Lesson 14: Codes, Specifications and Standards

Definitions; Function; Types; Qualification of personnel and facilities; CSA codes: W47.1; W55.3; W178; W59.1; W186; Z183; Z184; Z169; B51; AWS D1.1; D12.1; ASME code sections II, III, VIII, IX and XI; ASA B31.1; B31.4; B31.8; and API 650; Lloyd's Register of Shipping, American Bureau of Ships; CGSB 17-GP-1c; Consumables: CSA W-48 series; Bibliography.

Lesson 15: Welding Inspection Qualifications

CSA Standard W178 on the Qualification of welding inspection organizations; the Boiler and Pressure Vessels Act of Ontario; CSA Standards N285.1 and N285.5 (CANDU nuclear power plant components; CGSB standards on the certification of NDT personnel and inspectors; ASME B&PV code, sections III, VIII and IX.

SYMBOLS

Symbols

Hobart School of Welding Technology, Troy, Ohio. (Hobart Bros. Canada Ltd., Woodstock, Ont.)
....$250.00

9 Films/Instructor's Guide/Text/1 Symbols for Welding Learning Package/2 Written Tests/Answer Keys

The Instructor's Guide contains suggestions for teaching. The textbook entitled *Symbols for welding and Nondestructive Testing* is by the American Welding Society.

* * * *

XXXIII

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Consider a Career in Welding

American Welding Society. Miami, Fla.: Author, 1976, 9 pp.
(Canadian Welding Society, Weston, Ont.)
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XXXIV

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16mm Colour Film. 1968. Time: 7 mins.

Scenes are presented of spot welding and manual welding of jobs in aircraft maintenance, construction, and shipyards. Workers are performing automatic trackrod, flexcore, and short-arc welding work that goes into making forklifts and boilers.

* * * *

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Occupations in Welding

Mafex Associates, Inc., Johnstown, Penna. (Niagara Publishers, Fenwick, Ont.)
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Colour Filmstrip with Narration on Cassette Tape

This filmstrip introduces the student to the welding occupations, gives the qualifications of the apprenticeship program, states the general wage scales, lists job prospects, and discusses labour-management contracts.

* * * *

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Many kinds of welding are demonstrated in this film such as manual, spot horizontal, and automatic trackrod. The film also shows the range of job situations open to a welder from the small shop to plate and girder welding on skyscrapers.

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- Répertoire des matériaux didactiques: mécaniciens et réparateurs de véhicules automobiles
- Répertoire des matériaux didactiques: Soudage, brasage et coupage oxyacétyléniques

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Dans l'affirmative, veuillez vous adresser à:

Monsieur V.R. Blake
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